

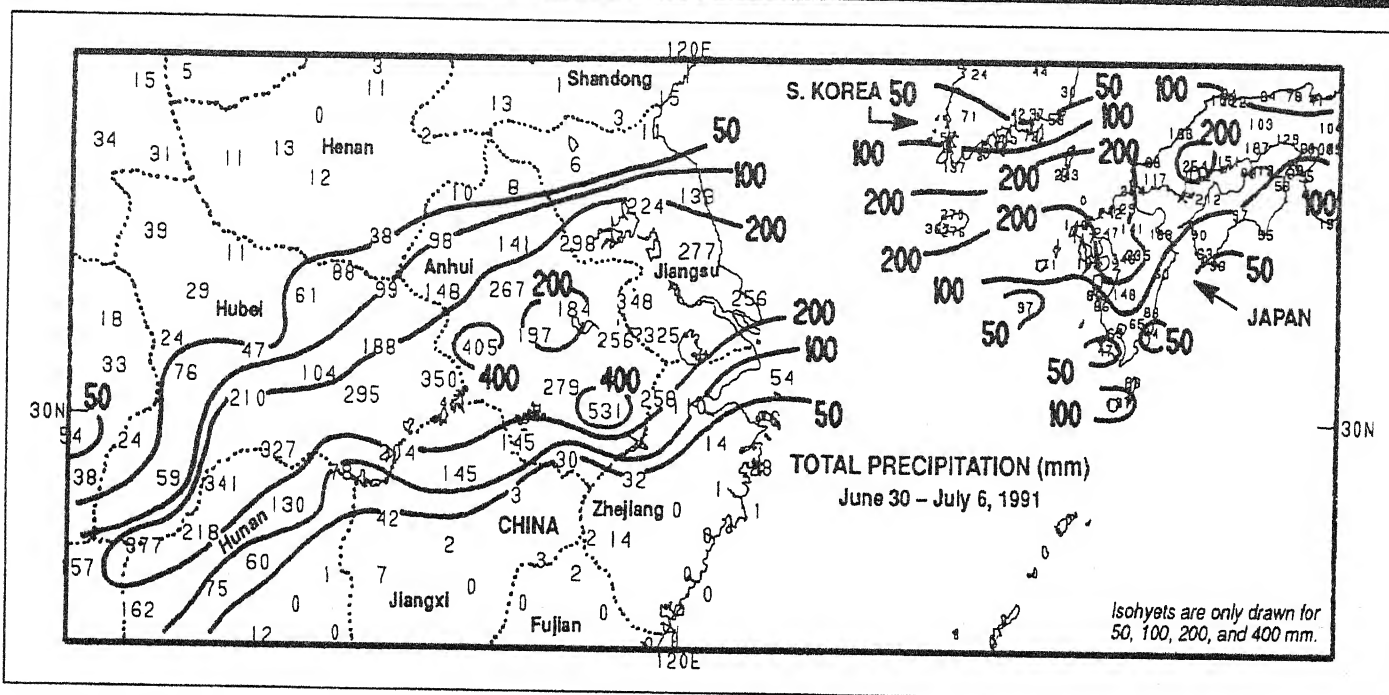
CONTAINS:
JUNE 1991
UNITED
STATES
MONTHLY
CLIMATE
SUMMARY

WEEKLY CLIMATE BULLETIN

No. 91/27

Washington, DC

July 6, 1991



Torrential rains again lashed central and eastern China, inundating tens of thousands of homes, numerous factories, and nearly ten thousand square kilometers of rice, wheat, vegetables, and fruit. The major wheat growing provinces of Anhui, Jiangsu, and Henan have been badly hit by floods, with half of the summer crop reported already lost. An additional 100-500 mm combined with earlier rains to produce major flooding along the Yangtze and Huai rivers. Lake Tai in Jiangsu province rose to record levels, breaking a few dams and threatening many others. Severe flooding was also reported in the Dongting Lake area in northern Hunan. A number of rail lines were forced to discontinue service, including a crucial Beijing-to-Shanghai link, stranding seven passenger cars filled with commuters. At least 600 lives have been lost due to heavy rains since late May. In addition, deluging rainfall early in the week pounded southern South Korea and western Japan. Nearly 250 mm of rain engendered mud and lava slides from Japan's Mount Unzen, devastating part of the city of Shimabara in western Kyushu.



UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE-NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER



WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- *Highlights of major climatic events and anomalies.*
- *U.S. climatic conditions for the previous week.*
- *U.S. apparent temperatures (summer) or wind chill (winter).*
- *Global two-week temperature anomalies.*
- *Global four-week precipitation anomalies.*
- *Global monthly temperature and precipitation anomalies.*
- *Global three-month precipitation anomalies (once a month).*
- *Global twelve-month precipitation anomalies (every three months).*
- *Global three-month temperature anomalies for winter and summer seasons.*
- *Special climate summaries, explanations, etc. (as appropriate).*

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

STAFF

Editor	Tom Heddinghaus
Associate Editor	Richard Tinker
Contributors	Joe Harrison
	Brian K. Hurley
	Paul Sabol
	David C. Stutzer
Graphics	Robert H. Churchill
	Alan Herman

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF JULY 6, 1991

Northwestern North America and Eastern Siberia:

HOT CONDITIONS EASE SLIGHTLY.

temperatures averaged 3°C to 6°C above normal through extreme eastern Siberia and southwestern Alaska while departures around 0°C affected most other locations. In addition, readings as high as 0°C in interior Alaska combined with abnormally dry conditions to fuel over a hundred wildfires across the state [3 weeks].

East-Central North America:

LIMITED RELIEF FROM ABNORMALLY HOT AND DRY CONDITIONS.

Weekly departures of +3°C to +6°C continued to affect the Corn Belt, Ohio Valley, and central Appalachians while slightly above normal temperatures brought an end to the warm spell elsewhere. Heat and high humidity, however, drove apparent temperatures to over 40°C at times across the southern tier of the region [Warm - 6 weeks]. Beneficial rains dampened much of the Virginia Piedmont, western Pennsylvania, and the northern half of Indiana, where 35-120 mm of rain fell. Similar amounts were reported at scattered locations across the Ohio Valley, central Appalachians, and eastern Nebraska while little or no rain was reported in the central and western Corn Belt and along the mid-Atlantic Coastal Plain. Since late May, deficits of 50-105 mm have accumulated in most areas [Dry - 6 weeks].

Southeastern United States:

MOISTURE SURPLUSES CONTINUE DECLINING.

Moderate rains (25-90 mm) dampened most locations, with scattered 100-200 mm totals reported across central and southeastern North Carolina, central and south-central Alabama, southern Mississippi, and southeastern Louisiana. Moisture surpluses have slowly declined below critical levels during the past few weeks, though pockets of excess wetness remain, particularly in southeastern Louisiana [Ended after 15 weeks].

Central Mexico:

HEAVY RAINS BRING WIDESPREAD FLOODING.

Weekly totals of 80-280 mm, with daily amounts up to 110 mm, inundated nine states across central Mexico, resulting in widespread flooding. Telephone and electrical outages hampered relief efforts throughout the flooded areas, and over a dozen lives were lost in the deluge, according to press reports [Episodic Event].

Eastern South America:

SEASONABLE DRYNESS PREVAILS.

Little or no rain fell throughout the previously soaked region, allowing rainfall surpluses to decline sharply [Ended after 8 weeks].

The Sahel:

POCKETS OF DRYNESS DEVELOP.

After abundant rainfall early in the rainy season, three weeks of

abnormally light rains have generated sizable moisture shortages across the three areas indicated below. Deficits as great as 145 mm have accumulated across western Senegal, where acute dryness is occurring for the second consecutive wet season, since late May. Little or no rain fell again last week, except through eastern Senegal and southwestern Mali, where 40-80 mm were reported [3 weeks].

7. Romania, Moldavia, and the Ukraine:

TORRENTIAL DOWNPOURS, HURRICANE-FORCE WINDS, AND HAIL BATTER REGION.

A series of severe storms marched through the region, bringing 60-175 mm of rain to most locations. Daily totals of 50-80 mm helped flood more than 3000 square kilometers of farmland across the agriculturally-rich region, according to press reports. Hail and hurricane-force winds aggravated the situation, damaging or destroying hundreds of buildings and residences [Episodic Event].

8. The New Lands:

ANOTHER DRY WEEK REPORTED.

Little or no rain fell on northern Kazakhstan and adjacent southwestern Siberia, intensifying moisture shortages. Since late March, deficits of 35-95 mm have developed throughout the region as only 25% - 50% of normal precipitation has fallen. Fewer than 20 mm of rain has fallen on some locations along the southern tier of the New Lands during the period [14 weeks].

9. Coastal Southern and Western India:

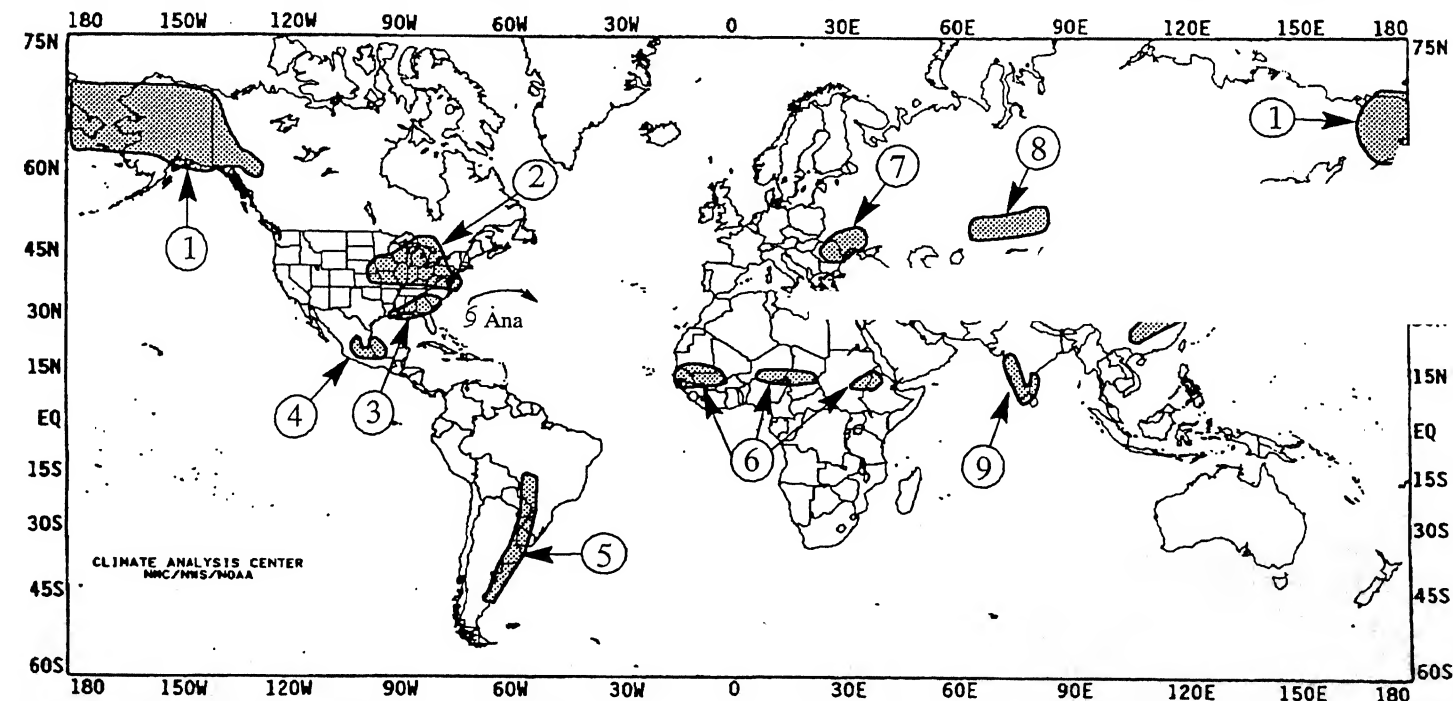
SEASONABLY HEAVY RAINFALL MEASURED.

Typically soaking monsoonal rains of 185-390 mm fell along the west-central coast from Daman southward to Panjim while 40-90 mm totals were observed at most other locations. The very high mid-summer normals observed throughout the region have helped alleviate the moisture excesses that accumulated earlier in the monsoon season [Ended after 5 weeks].

10. Kyushu, Southern South Korea, and East-Central and Northeastern China:

INUNDATING RAINS FLOOD THE YANGTZE RIVER VALLEY.

Widespread flooding was generated by 105-530 mm of rain that fell throughout the Yangtze River Valley, cutting off the main Beijing-to-Shanghai railroad and taking over a hundred lives, according to press reports. Nearly 10,000 square kilometers of farmland were flooded by the intense cloudbursts, which combined with earlier rains to send Lake Tai to unprecedented levels, breaking a 37-year-old record. Since early June, up to 955 mm of rain have drenched the eastern Yangtze River Valley, where 300-585 mm of excess rain has fallen. Farther north and east, rainfall totals of 80-370 mm enhanced moisture surpluses in Kyushu and southern South Korea while 30-80 mm soaked interior Manchuria and Nei Mongol, where more than twice the normal precipitation has been reported since late May (see front cover) [5 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.
MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long-term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF JUNE 30–JULY 6, 1991

Searing heat baked a large portion of the country, particularly in the West where highs routinely climbed into triple digits across the interior sections of California. Despite the intense heat only a few record daily highs were established. The mercury soared to 110°F at Sacramento, CA on Thursday establishing a new record while to the north, Redding, CA reported a record high of 114°F. Sweltering conditions were not limited to the West however, readings topping 100°F were also measured in portions of the Rockies and Great Plains. Farther east, high humidities combined with the heat to create oppressive conditions across the South, Midwest, and mid-Atlantic. Apparent temperatures approaching 110°F were observed from Mississippi to Kentucky and record daily highs were established from Colorado to Maryland. The muggy conditions that ripped the eastern half of the nation fueled severe thunderstorms that generated brief, but intense rainfall, localized flooding, hail, and tornadoes. Nearly 3.5" of rain fell on portions of north-central Texas in the hour on Wednesday. Heavy rain caused flooding in San Antonio, TX and Brownsville, TX after 3" of rain fell in a four hour period, forcing some streams and creeks out of their banks. Copious amounts of rain and unusually high tides produced flooding in Charlotte Harbor, FL, isolating several homes near Punta Gorda, FL. On Wednesday, a tropical depression that formed off the northeast coast of Florida reached tropical storm strength east of North Carolina and eventually tracked northeastward, remaining over the open waters of the Atlantic Ocean. Meanwhile in Alaska, unusually warm conditions enveloped much of the state. The mercury at St. Paul Island, AK reached a record high 60°F on Thursday, the first time since August 15, 1989 that the temperature has hit the 60°F mark.

As the week unfolded, hot and muggy conditions persisted across much of the eastern and southern U.S. Some locations in the mid-Atlantic reported record high minimum temperatures as readings only dropped to the eighties. Downtown Baltimore, MD dipped to a record high minimum of 84°F Sunday morning which also tied the record for the highest minimum temperature in June. Later in the day, the mercury soared to 100°F to establish a record daily high. However, to the north a cold front inched southward. Strong thunderstorms erupted along the front as it moved through southern New England. The front eventually pushed as far south as southern Virginia where it stalled providing somewhat cooler conditions to the north of the front while muggy weather persisted to the south. Apparent temperatures reached dangerous levels across parts of the deep South with apparent temperatures reaching 109°F in Jackson, MS on Tuesday. Farther west, a cold front trekked across the northern and central Rockies, triggering severe weather in the north-central U.S. on Sunday and Monday. Heavy rain, large hail, and tornadoes accompanied some storms. Almost 4.5" of rain fell near Wolf Point, MT while hail the size of softballs was reported in parts of southeastern Montana, causing some damage. Tornadoes touched down from Wyoming to Wisconsin. As the front shifted eastward, unseasonably cool air settled across the northern Rockies and Plains. Frost covered the ground at Yellowstone National Park on Monday morning as lows sunk to the thirties. In marked contrast, intense heat persisted ahead of the front.

Highs soared above 100°F in portions of Kansas and Nebraska on Monday. Farther west, hot conditions also overspread much of the far West and Southwest as highs neared 110°F in the interior Valleys of California and across parts of southern Arizona.

During the latter half of the week, sweltering heat continued in the West. Highs soared above the century mark the Southwest to parts of the Pacific Northwest. Death Valley, CA recorded a high of 125°F on Wednesday while Pasco, WA reached 113°F. To the east, a cold front continued to trek eastward through the Great Plains and upper Midwest, spawning severe weather in the upper Midwest and slightly cooler readings to portions of the Great Plains. Farther south, strong thunderstorms popped up across the Gulf states, dumping heavy rains on parts of Texas, Louisiana, and Florida. Tallahassee, FL measured over 3" of rain on Saturday. Meanwhile, hot and humid conditions prevailed across most of the South. Apparent temperatures soared to 110°F in Louisville, KY on Saturday. To the west, hot weather returned to the southern half of the Great Plains by the weekend where readings were once again above 100°F. Concordia, KS reported a record daily high of 108°F on Saturday.

According to the River Forecast Centers, the greatest weekly totals (more than 2 inches) fell on south-central Texas, much of the lower Mississippi Valley, the central Gulf Coast, the southern two-thirds of Florida, much of the Southeast, mid-Atlantic, the northern Ohio Valley, the upper Midwest, and scattered locations across the northern and central Plains, and southern Alaska. Light to moderate amounts were measured across most of the eastern half of Texas, the central Plains, the South, the western Corn Belt, the remainders of Florida, the mid-Atlantic, and Ohio Valley, the southern half of New England, the upper Midwest, the southern half of Alaska, and eastern Hawaii. Little or no precipitation was recorded in northern New England, the western half of the contiguous U.S., and the remainders of Alaska and Hawaii.

Unseasonably warm weather covered a large portion of the contiguous U.S. from the far West to the mid-Atlantic. Weekly departures of +6°F to +9°F were prevalent across the central Appalachians and Ohio Valley, parts of the central Plains and most of interior California where daily highs topped 100°F most of the week. Departures between +3°F and +5°F were common from the Southeast westward to the High Plains, and across portions of the Pacific Northwest. In Alaska, unusually mild conditions enveloped much of the state with some locations recording highs up to 90°F. Weekly departures up to +9°F were recorded at Nome, AK while departures between +2°F and +8°F were observed across most of the remainder of the state.

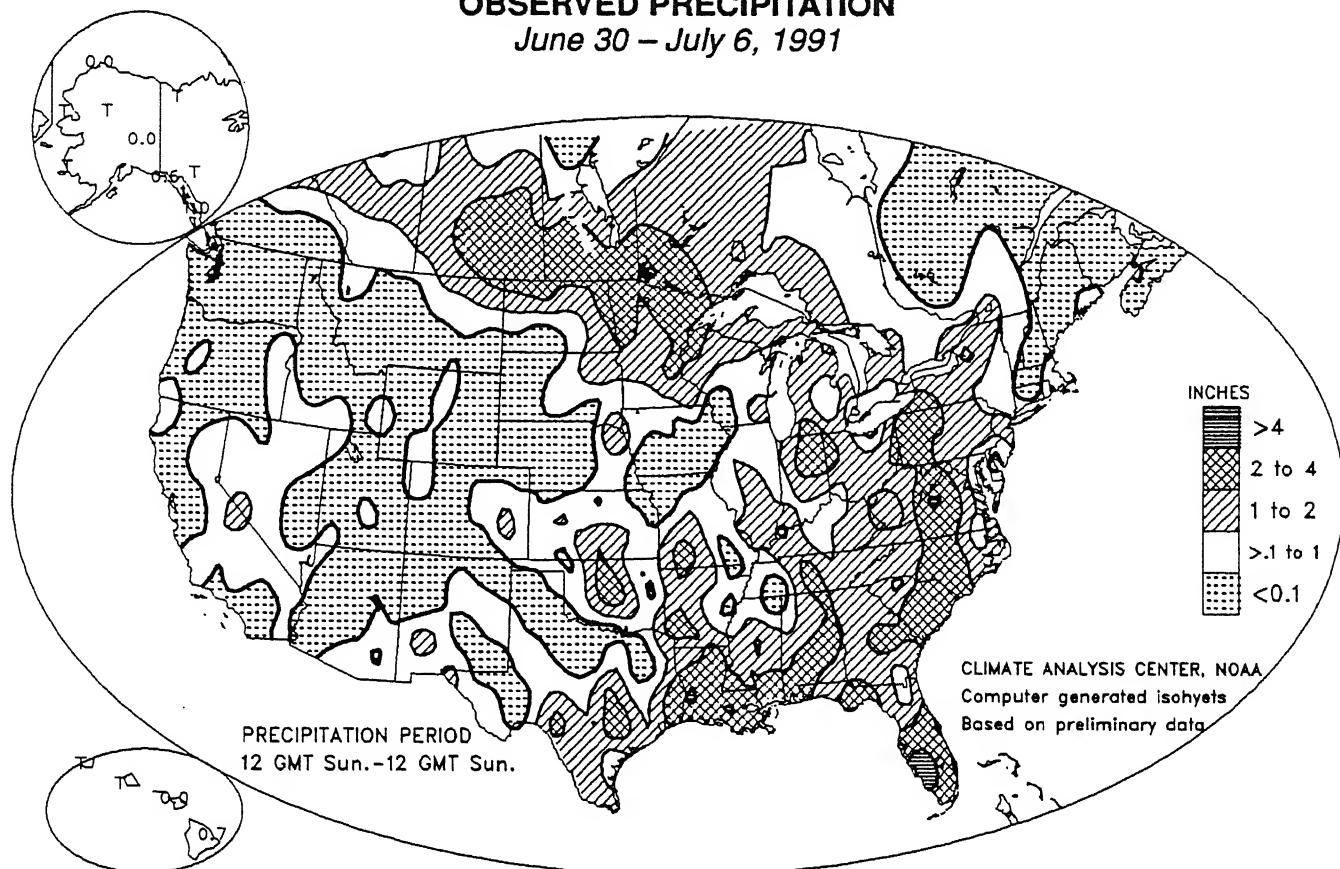
In contrast, unseasonably cool weather was limited to the northern two-thirds of New England, the extreme northern sections of the upper Midwest, Great Plains, Rockies, and the southwestern half of Texas. Weekly departures between -3°F and -6°F were common across northern New England and parts of Texas with the remainders of the aforementioned areas observing only near to slightly below normal temperatures. Subnormal temperatures were also reported across extreme southeastern Alaska with departures down to -2°F at a few locations.

TABLE 1. SELECTED STATIONS WITH 3.00 OR MORE INCHES OF PRECIPITATION DURING THE WEEK OF JUNE 30 – JULY 6, 1991

STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
COLUMBIA, SC	7.88	NEW ORLEANS/LAKE FRONT, LA	3.67
FORT MYERS, FL	6.61	CAPE CANAVERAL AFS, FL	3.37
DAYTONA BEACH, FL	5.91	ATHENS, GA	3.33
CHARLOTTESVILLE, VA	4.78	LAFAYETTE, LA	3.30
CHARLESTON, SC	4.38	HIBBING, MN	3.15
TALLAHASSEE, FL	4.27	WILMINGTON, NC	3.14
ALEXANDRIA/ENGLAND AFB, LA	4.09	HOMESTEAD AFB, FL	3.12
FAYETTEVILLE/POPE AFB, NC	4.06	PITTSBURGH, PA	3.12
MINOT AFB, ND	4.06	NEW ORLEANS NAS, LA	3.09
FAYETTEVILLE/FT BRAGG NDB, NC	4.03	MONTGOMERY, AL	3.04
APALACHICOLA, FL	3.82		

OBSERVED PRECIPITATION

June 30 – July 6, 1991



DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

June 30 – July 6, 1991

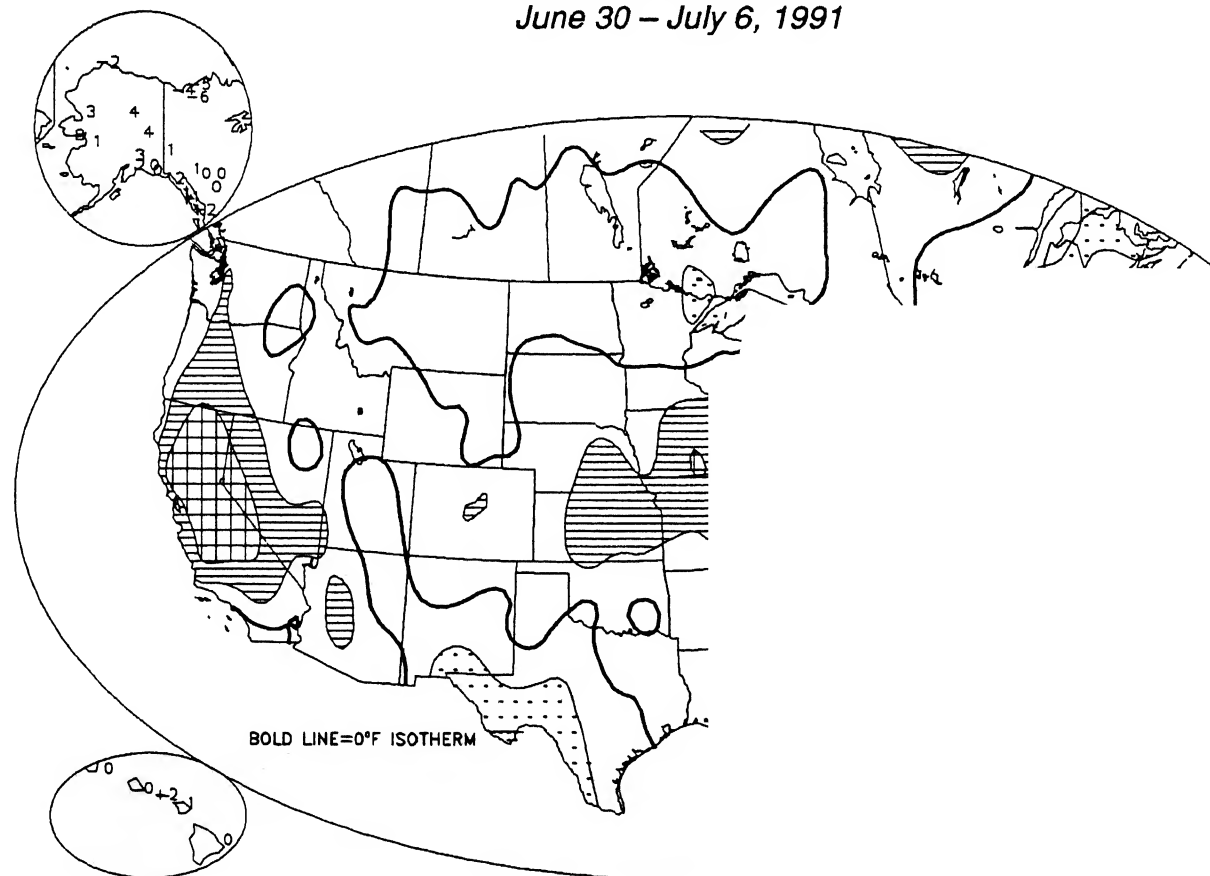


TABLE 2. SELECTED STATIONS WITH TEMPERATURES AVERAGING 6.5°F OR MORE ABOVE NORMAL FOR THE WEEK OF JUNE 30 – JULY 6, 1991

<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)	<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)
VICTORVILLE/GEORGE AFB, CA	+11.1	87.7	COLUMBUS, OH	+7.4	80.7
MARYSVILLE, CA	+8.9	86.6	UKIAH, CA	+7.3	79.7
SOUTH BEND, IN	+8.6	80.5	MILWAUKEE, WI	+7.3	76.6
SACRAMENTO, CA	+8.5	83.0	BETHEL, AK	+7.1	61.1
NOME, AK	+8.5	57.7	RED BLUFF, CA	+7.0	87.9
FRESNO, CA	+8.2	87.8	CHARLESTON, WV	+6.9	80.5
BLUE CANYON, CA	+8.2	74.4	BECKLEY, WV	+6.9	75.4
AKRON, OH	+7.8	78.6	SAN JOSE, CA	+6.9	75.0
MCGRATH, AK	+7.7	65.9	PASO ROBLES, CA	+6.8	79.5
ZANESVILLE, OH	+7.6	79.4	ST. LOUIS, MO	+6.6	84.8
STOCKTON, CA	+7.5	83.8			

TABLE 3. SELECTED STATIONS WITH TEMPERATURES AVERAGING 3.0°F OR MORE BELOW NORMAL FOR THE WEEK OF JUNE 30 – JULY 6, 1991

<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)	<u>STATION</u>	<u>DEPARTURE</u> (°F)	<u>AVERAGE</u> (°F)
WORCESTER, MA	-6.5	62.3	PROVIDENCE, RI	-4.0	67.2
CONCORD, NH	-6.4	62.1	EL PASO, TX	-4.0	79.0
BOSTON, MA	-6.1	66.1	LAREDO, TX	-4.0	82.9
HOULTON, ME	-5.2	59.9	GLENS FALLS, NY	-3.8	64.9
MT. WASHINGTON, NH	-5.1	42.8	ALBANY, NY	-3.8	66.6
DULUTH, MN	-4.7	58.9	PORTLAND, ME	-3.5	63.2
HARTFORD, CT	-4.7	67.7	AUGUSTA, ME	-3.4	64.8
DEL RIO, TX	-4.7	80.9	CARIBOU, ME	-3.3	61.0
MONTPELIER, VT	-4.5	61.1	SAN ANGELO, TX	-3.1	80.2
LEBANON, NH	-4.3	63.2	WARROAD, MN	-3.0	63.2
UTICA, NY	-4.2	64.6	ROME/GRIFFISS AFB, NY	-3.0	65.8
RUMFORD, ME	-4.0	62.1			

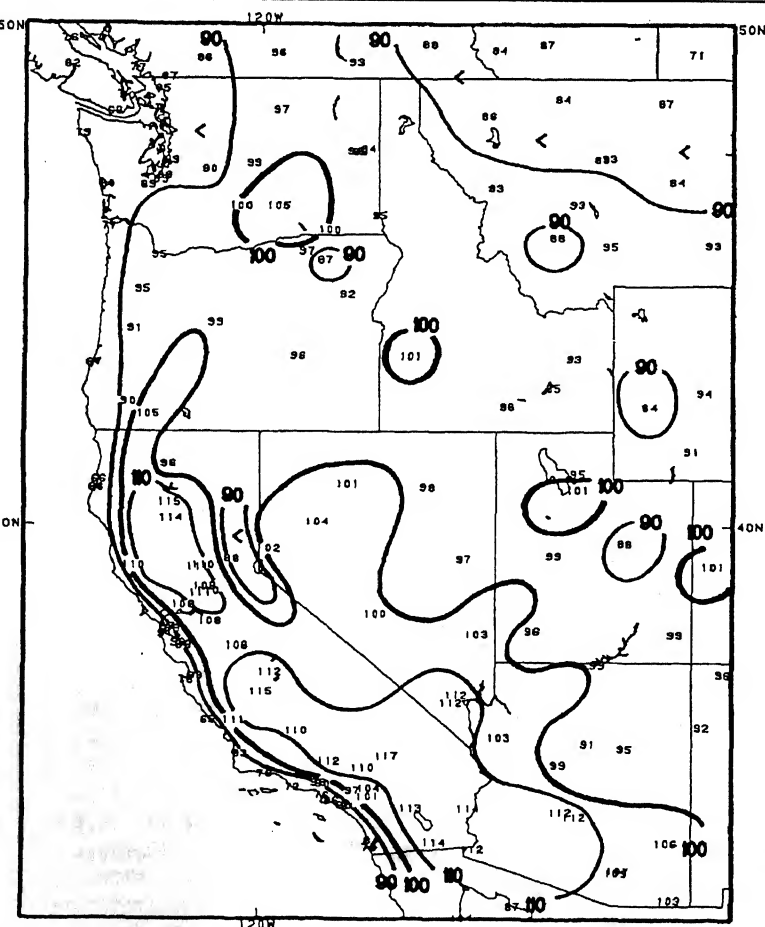
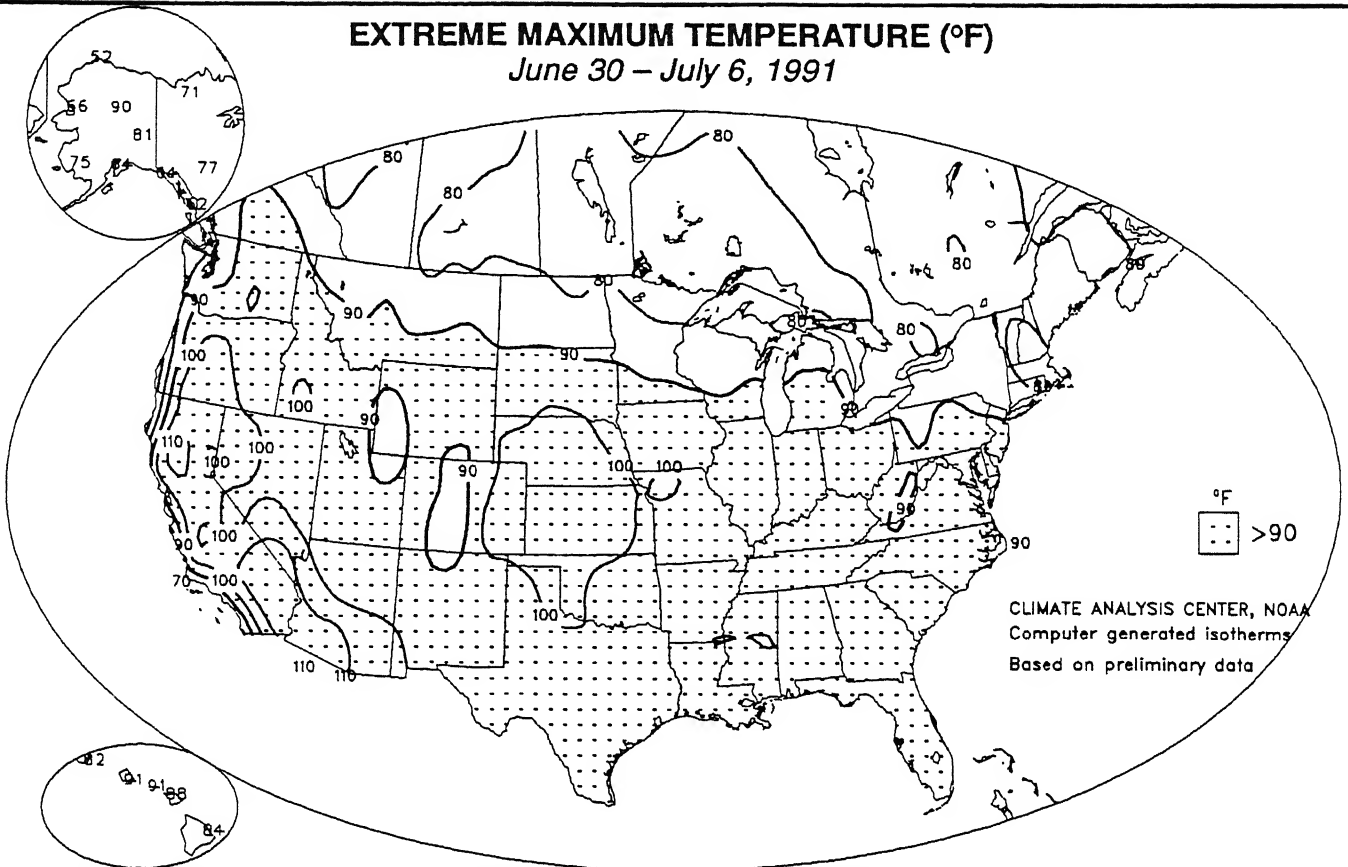


FIGURE 1. Extreme Maximum Temperature (°F), June 30–July, 1991. *Intense heat baked much of the western U.S. during the week. Highs topping 100°F were reported from southern Arizona to southeastern Washington, and at scattered locations across the Great Basin with some cities recording their first 100°F+ temperatures of 1991. Daily record highs were established in parts of California and Nevada as readings approached 115°F across the interior valleys of California. Moffett Naval Air Station near San Francisco, CA observed a record high of 94°F on Tuesday. Highs exceeding 120°F were recorded in the desert areas of southern California with the highest reading (125°F) occurring in Death Valley, CA on Wednesday.*

EXTREME MAXIMUM TEMPERATURE (°F)

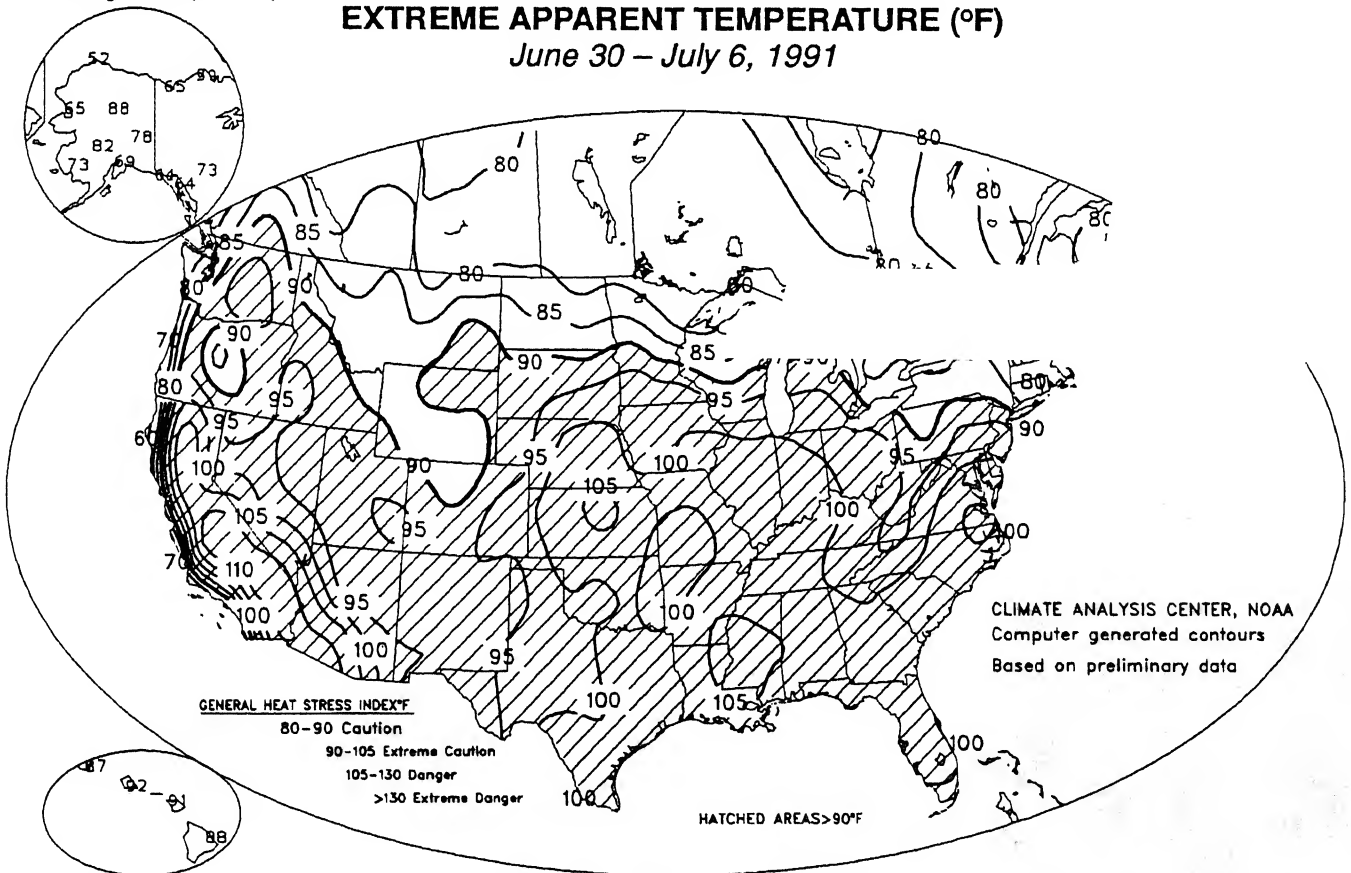
June 30 – July 6, 1991



Much of the nation simmered during the week as 90°F+ readings eluded only the northern tier of states, Pacific coast, and portions of the Rockies and Appalachians. Extreme heat encompassed the central Plains, Great Basin, desert Southwest, and interior portions of California as temperatures soared above the century mark (top). The combination of the intense heat with high humidity allowed for sultry conditions in portions of the Lower Mississippi Valley, central Plains, desert Southwest, and California with apparent temperatures of 105°F and greater (bottom).

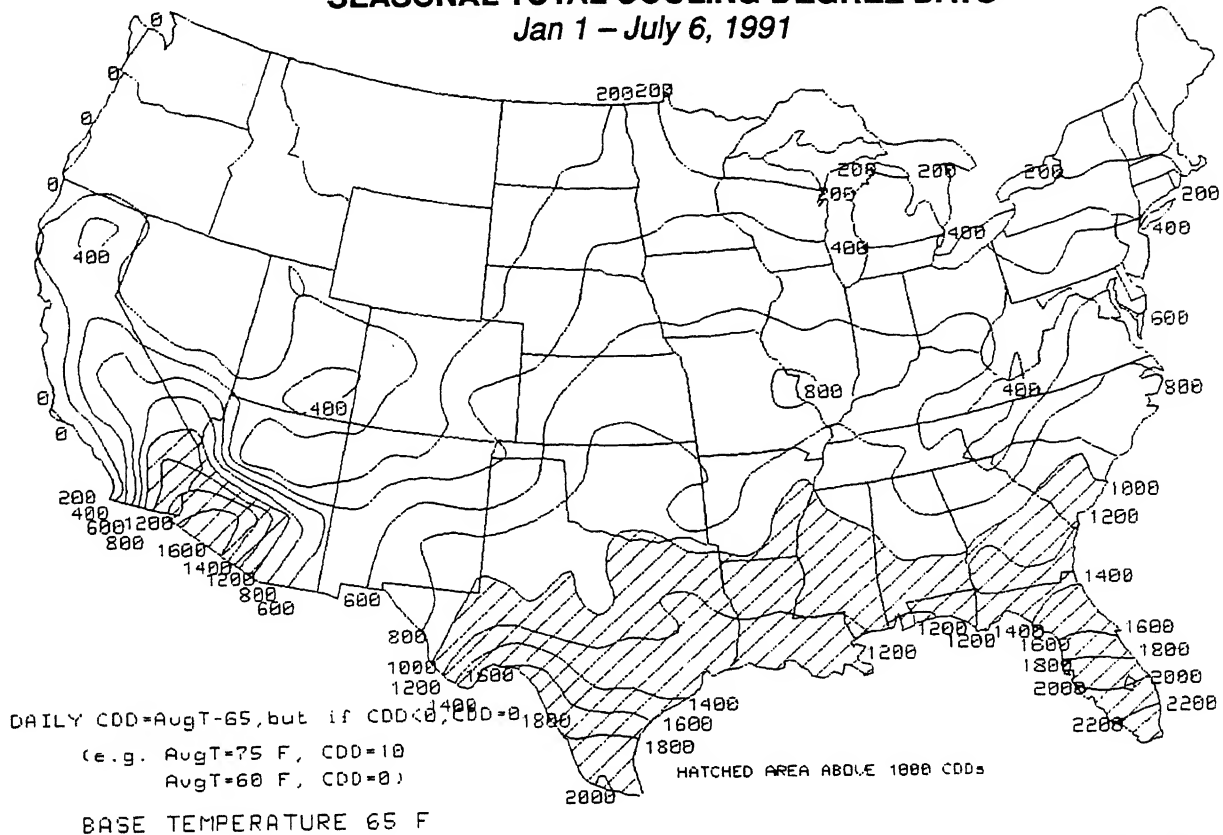
EXTREME APPARENT TEMPERATURE (°F)

June 30 – July 6, 1991



SEASONAL TOTAL COOLING DEGREE DAYS

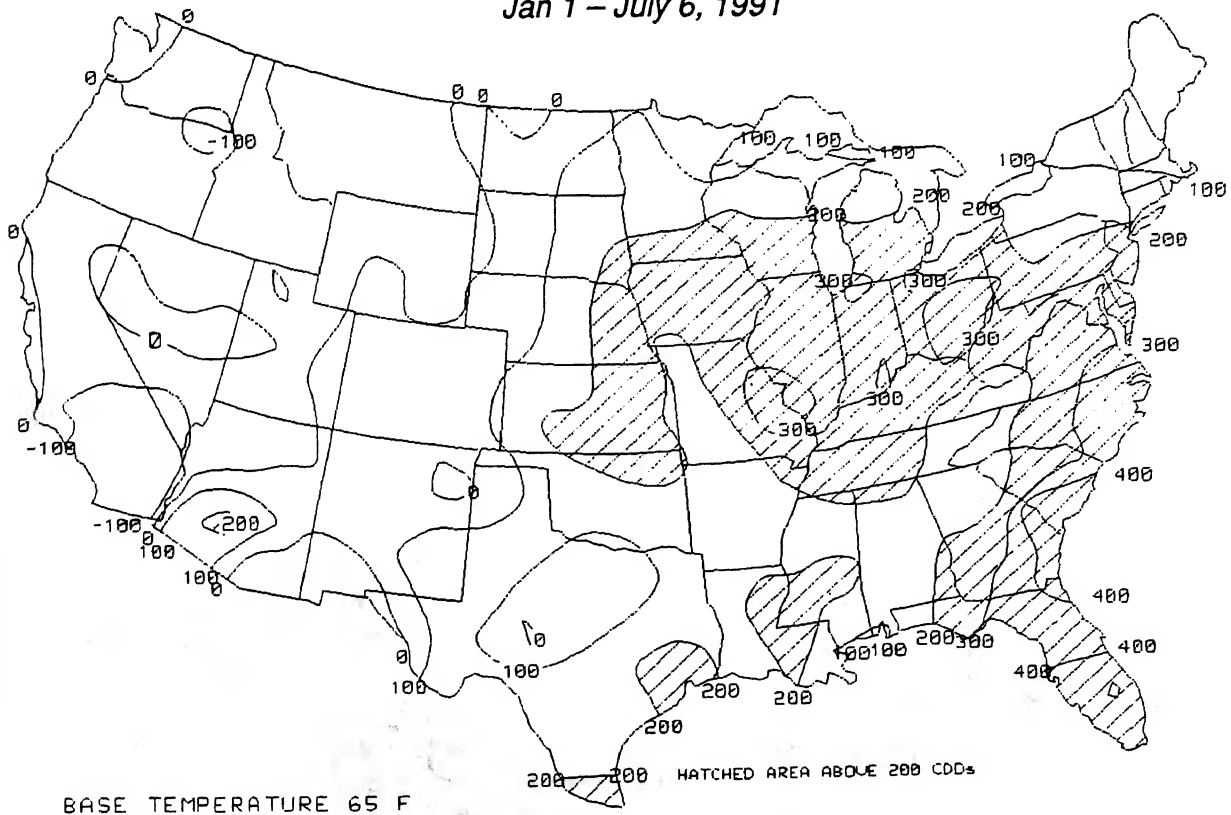
Jan 1 – July 6, 1991



Above normal spring temperatures and a hot summer thus far have generated significant cooling consumption across most of the southern tier of states with CDD's exceeding 1000 (top). While the abnormal warmth has caused excessive cooling demand in much of the Midwest and East, below normal temperatures during spring and early summer have resulted in below normal cooling need across the West (bottom).

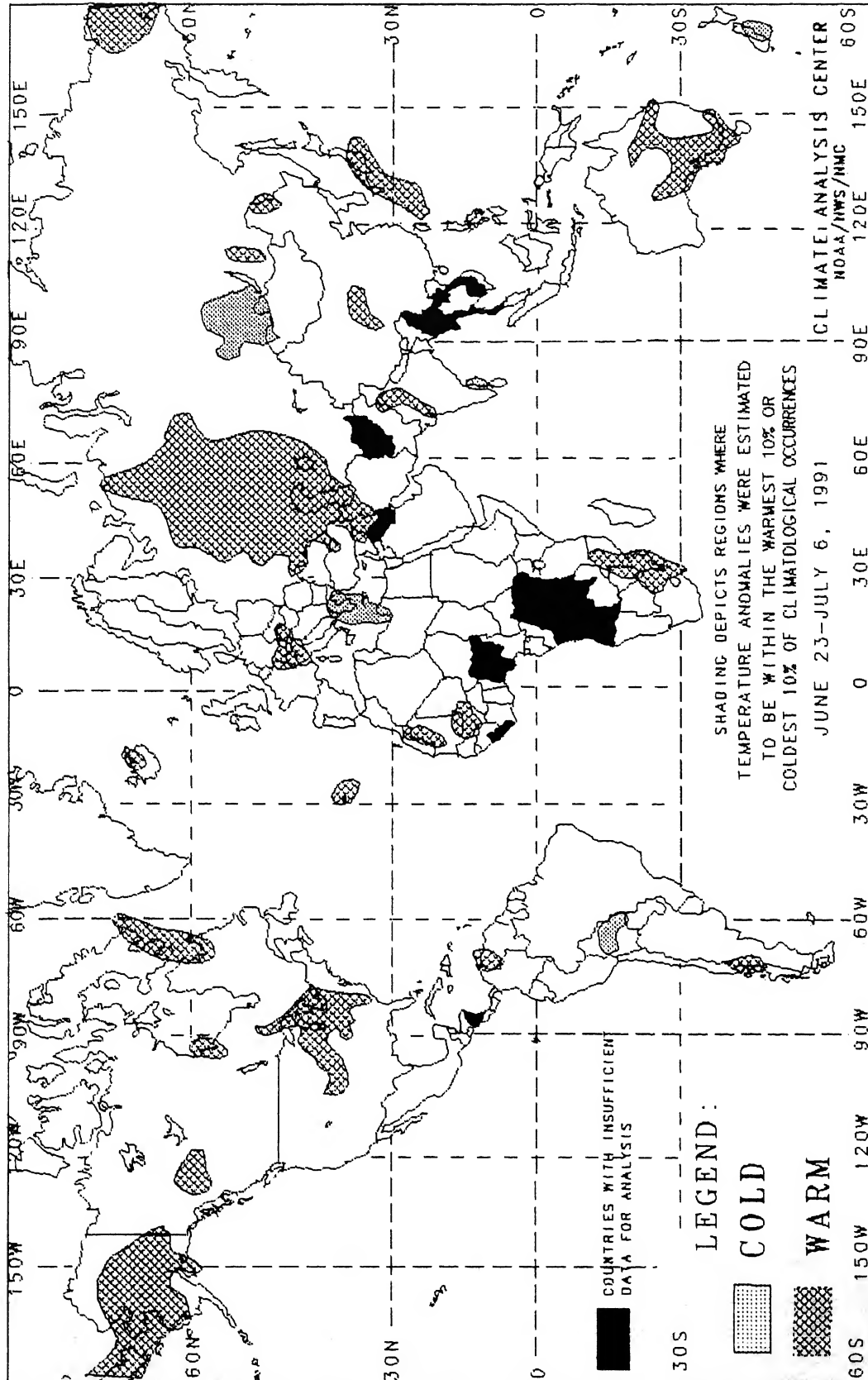
ACCUMULATED DEPARTURE FROM NORMAL CDD (SEASONAL)

Jan 1 – July 6, 1991



2-WEEK GLOBAL TEMPERATURE ANOMALIES

JUNE 23 – JULY 6, 1991



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

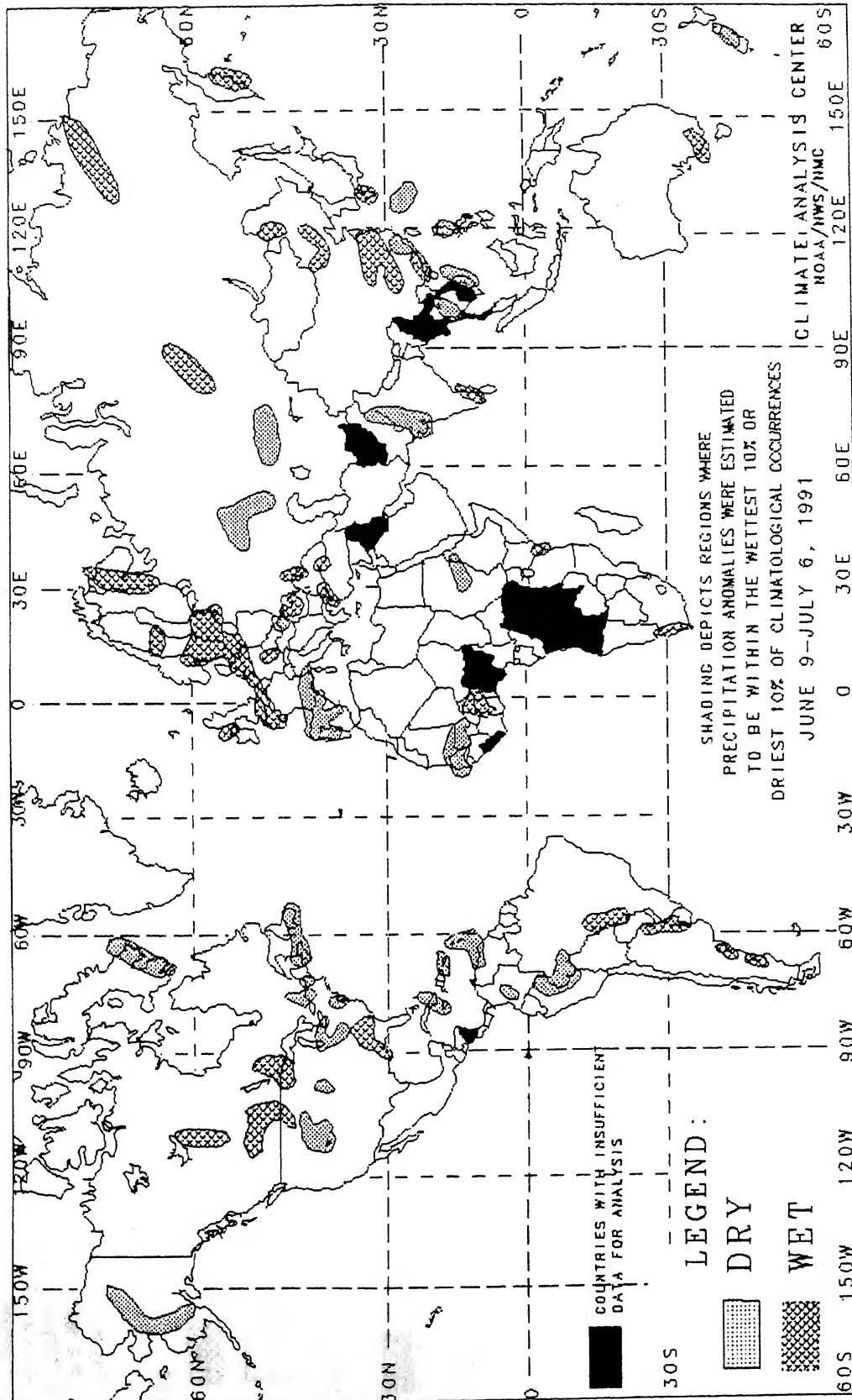
Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions

4-WEEK GLOBAL PRECIPITATION ANOMALIES

JUNE 9 - JULY 6, 1991



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

UNITED STATES MONTHLY CLIMATE HIGHLIGHTS

JUNE 1991

Warm and occasionally violent weather again prevailed across much of the Great Plains, lower Mississippi Valley, and Southeast while hot and dry conditions persisted over much of the Northeast and Corn Belt and unseasonably cool weather continued in the Far West. Severe thunderstorms rumbled across the Plains, triggering more tornadoes, intense downpours, large hail, and strong wind. The rainfall across the North Central States during the past few months has produced localized flooding, but has been very beneficial in relieving long term dryness (see back cover). Thunderstorms also battered the South as an additional 7–12 inches of rains fell on already saturated soils in portions of Louisiana, Alabama, Georgia, and Florida (Table 1). Rainfall in the South has been quite heavy since the beginning of the year, with four southern states (FL, GA, LA, and MS) experiencing their wettest January–June period on record (page 18). According to preliminary data, 231 tornadoes during June brought the 1991 year-to-date total up to 1157, far exceeding the previous January–June record of 834 set just last year (page 11). Preliminary data, however, usually overestimate the actual number of touch-downs. Hot, dry weather continued to parch much of the Northeast, Ohio Valley, and Corn Belt, stressing developing crops and heightening concerns over water supplies. Hot and dry conditions also prevailed over Alaska, where the mercury at Hogatza River reached 97°F on June 21, coming within 3°F of the all-time record for the state. In sharp contrast, temperatures continued well below normal in the Pacific Northwest, where monthly departures were below –4°F (Table 4).

The month commenced with severe weather and sweltering heat plaguing the nation's midsection. Intense thunderstorms spread eastward, spawning tornadoes, large hail, high wind, and heavy rains that caused widespread flash flooding. Torrential rains inundated portions of the western Corn Belt, central and southern Plains, central Gulf coast, Tennessee Valley, and Southeast. Dozens of tornadoes touched down from the Plains to the Atlantic coast. Fifty homes were damaged or destroyed in Minatare, NE by a large tornado. Hot air across the northern Plains and upper Mississippi Valley expanded across much of the country by mid-month. Numerous daily record highs were established, with Philadelphia, PA reaching a 100°F on the 15th, setting a June record (Table 7). Unseasonably cool conditions, however, continued to affect the Pacific Northwest and parts of the northern Rockies. Missoula, MT observed their lowest June temperature on record, dropping to 31°F on the 15th (Table 7).

During the latter half of the month, widespread thunderstorms again triggered tornadoes, flash flooding, large hail, and strong winds across the Plains, upper Great Lakes, lower Mississippi Valley, and Southeast. Scattered heavy rains provided relief from dryness at some locations across the mid-Atlantic. Little or no rain fell on the remainder of the country as abnormally dry conditions became entrenched across the Corn Belt, upper Ohio Valley, and Northeast. Hot weather continued to prevail from the High Plains to the Atlantic coast, but cooler air brought relief to the Southeast and mid-Atlantic toward month's end. Temperatures in Alaska soared into the low eighties along the northeastern Arctic coast and into the nineties throughout the interior as

most of the state experienced its hottest summer solstice on record. In sharp contrast, chilly conditions set daily record lows in the Pacific Northwest and northern California.

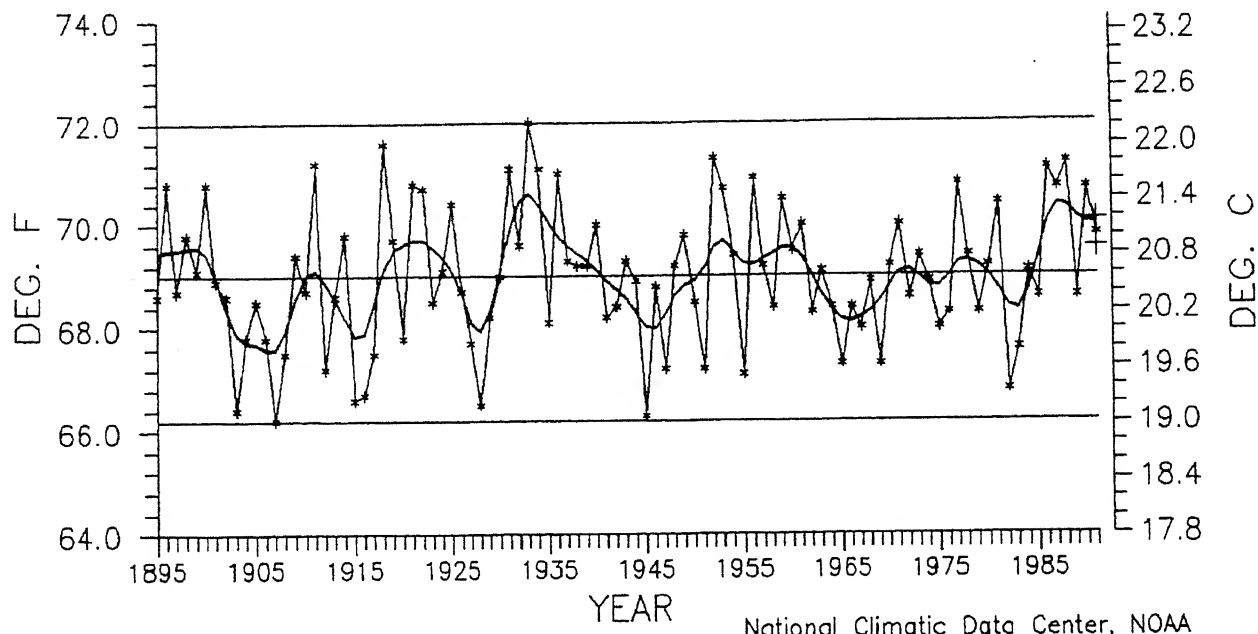
According to the River Forecast Centers, the greatest monthly totals (more than 6 inches) fell along the Gulf coast and at scattered locations across the Great Plains, the upper and lower Mississippi Valley, the Southeast, the mid-Atlantic, Alaska, and Hawaii (see Table 1, Figures 1 and 2). Moderate to heavy amounts were recorded in the remainders of the Southeast, the lower and upper Mississippi Valley, the northern and southern Plains, and in parts of the mid-Atlantic, southern Alaska, and Hawaii. Abnormally heavy rainfall also covered much of the Northwest and Southwest with some locations receiving more than twice their normal, although amounts are typically low during summer west of the Rockies (Figure 1). Regionally (see back cover), only the West North Central and Northwest ranked in the upper third of the historical precipitation distribution (page 11). Nationally, 1991 has been wetter than normal so far, ranking as the 36th wettest January–June period on record (page 18). Nine states (AL, FL, GA, IA, LA, MN, MS, ND, and SD) had one of their tenth wettest January–June periods on record.

Abnormally dry conditions extended from the central Plains across the middle Mississippi and Ohio Valleys and into the Northeast and parts of the mid-Atlantic; much of this area received less than half of their normal rainfall (Table 2, Figures 1 and 2). Seasonably dry weather also prevailed over much of California, the Southwest, the Great Basin, the upper Rio Grande Valley, northern and central Alaska, and central Hawaii. Climatologically, June 1991 was among the driest 10% of all Junes across parts of the Corn Belt and Northeast (Figure 2). Regionally, the Central and Northeast had their 4th and 5th driest Junes on record, respectively, while the nation as a whole had the 42nd driest June. During the first half of 1991, MD recorded its 9th driest January–June period since 1895 (page 18).

Unseasonably hot weather covered much of the eastern three-fourths of the country as well as Alaska. Monthly departures between +4°F and +7°F were recorded in the upper and middle Mississippi Valley, the Great Lakes, the Northeast, and in northern and central Alaska (Table 3, Figures 3 and 4). Nationally, June 1991 ranked as the 28th warmest June in 117 years of record and was the 5th June in that region recorded its 5th warmest months of the year, six states (CA, IL, IN, MI, NY, and OH) observed their warmest start to a year. June 1991 ranked as the 10th warmest January–June period on record, with temperatures during the month consistently above normal (page 18).

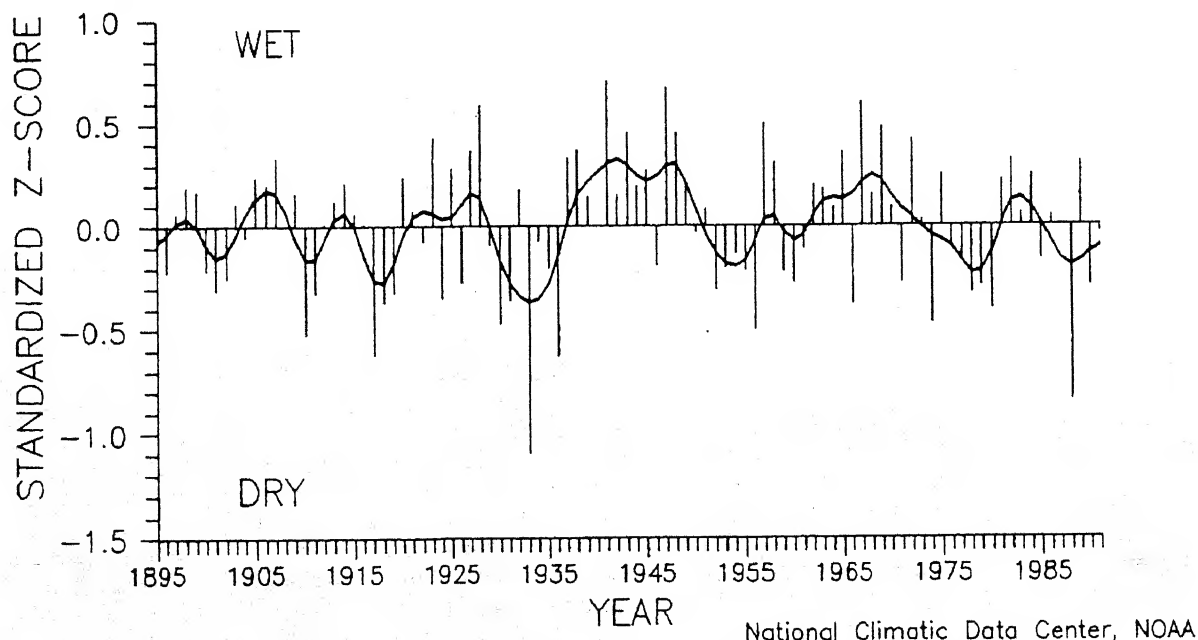
Cooler than normal conditions prevailed in the Pacific Northwest, with monthly departures of –4°F to –10°F recorded in the Northwest, northern California (Table 4, Figures 3 and 4). Temperatures were near normal in parts of the southern Plains, the Southeast, and Hawaii. The Vernal Equinox finished in the lower third of the historical distribution with their 23rd coolest June on record

U.S. NATIONAL TEMPERATURE JUNE, 1895-1991



Nationally Averaged June Temperatures, As Computed by the National Climatic Data Center. *June 1991 ranked as the 28th warmest June on record, and is the fifth June in the last six years to rank considerably above normal.*

U.S. NATIONAL MEAN PRECIPITATION INDEX JUNE, 1895-1991



National Mean June Precipitation Index, 1895-1991, As Computed by the National Climatic Data Center. *June 1991 ranked as the 42nd driest June on record. This index takes into account local normals so that typically wet regions do not dominate the index value.*

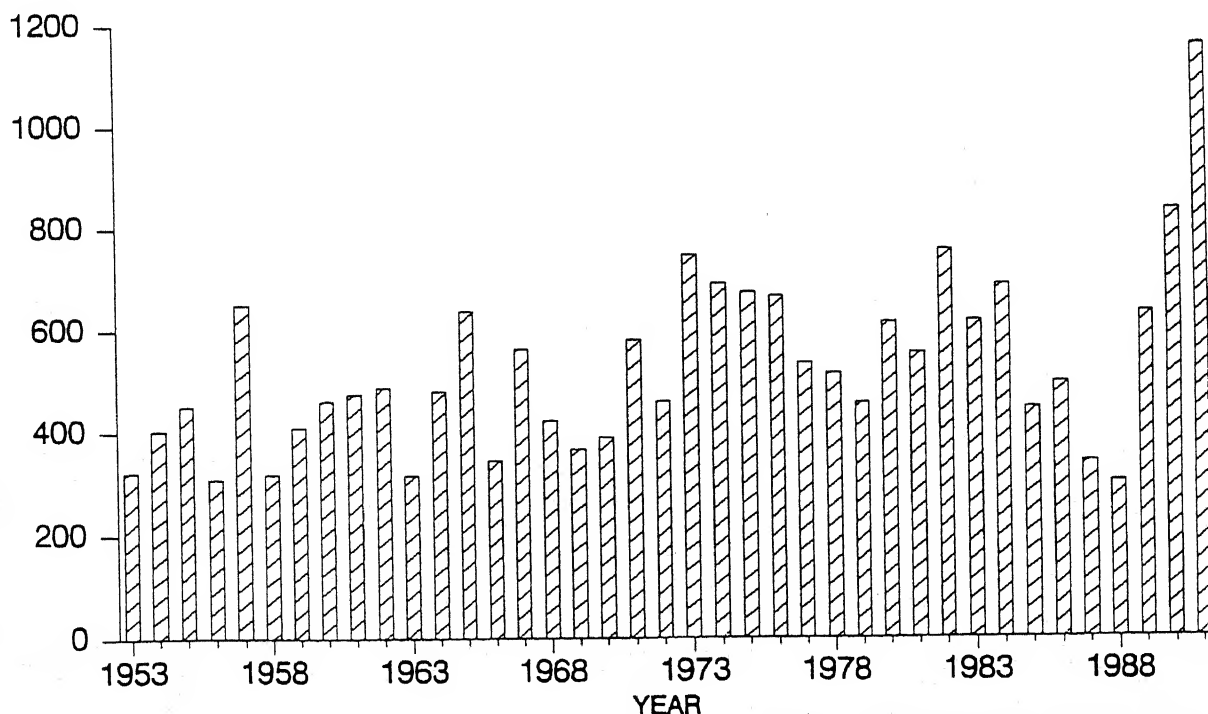
TEMPERATURE AND PRECIPITATION RANKINGS FOR JUNE 1991, BASED ON THE PERIOD 1895 TO 1991. 1 = DRIEST/COLDEST AND 97 = WETTEST/HOTTEST.

<u>REGION</u>	<u>PRECIPITATION</u>	<u>TEMPERATURE</u>
NORTHEAST	5	83
EAST NORTH CENTRAL	37	93
CENTRAL	4	84
SOUTHEAST	64	46
WEST NORTH CENTRAL	89	75
SOUTH	54	75
SOUTHWEST	63	69
NORTHWEST	72	48
WEST	55	23
NATIONAL	42	70

National Climatic Data Center

TOTAL NUMBER OF TORNADES, U.S.A.

JANUARY-JUNE TOTAL, 1953-1991



National Climatic Data Center, NOAA

Total Number of Tornadoes in the Contiguous U.S., January-June, 1953 to 1991. *There were 231 tornadoes across the nation in June, 1991, well above the 1953-1990 average of 155 but below the record of 329 set last year. The January-June, 1991 total of 1157 is a record and well above the previous record of 834 set in 1990. The preliminary count, however, is generally higher than the final count.*

TABLE 1. SELECTED STATIONS WITH 150% OR MORE OF THE NORMAL PRECIPITATION AND 7.00 INCHES OR MORE PRECIPITATION; OR, STATIONS WITH 7.00 INCHES OR MORE PRECIPITATION AND NO NORMALS DURING JUNE 1991.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	STATION	TOTAL (INCHES)	PCT. OF NORMAL
JACKSONVILLE NAS, FL	11.72	***	NEW ORLEANS NAS, LA	8.50	***
NEW ORLEANS/LAKE FRONT, LA	11.69	***	CHERRY POINT MCAS, NC	8.29	***
JACKSONVILLE, FL	11.69	202.6	ABILENE/DYESS AFB, TX	7.77	***
ATHENS, GA	10.94	274.9	HOUSTON, TX	7.69	173.6
NEW ORLEANS/MOISANT, LA	10.66	231.2	LAKE CHARLES, LA	7.65	186.6
WAYCROSS, GA	10.60	180.6	BLTTHEVILLE AFB, AR	7.51	208.6
HOMESTEAD AFB, FL	10.20	***	VALDOSTA, GA	7.41	***
HILO/LYMAN, HAWAII, HI	10.19	166.8	ANNISTON, AL	7.40	190.2
HOUSTON/W.M. HOBBY, TX	10.09	***	ALTUS AFB, OK	7.35	***
ATLANTA, GA	9.99	294.7	WATERTOWN, SD	7.34	185.4
DAYTONA BEACH, FL	9.76	152.3	VIRGINIA BEACH/OCEANA NAS, VA	7.30	***
LAFAYETTE, LA	9.47	226.6	PORT ARTHUR, TX	7.25	150.7
CORPUS CHRISTI NAS, TX	8.78	***	OMAHA/EPPLEY, NE	7.20	176.5
KODIAK, AK	8.66	213.3	TUSCALOOSA, AL	7.06	212.7

NOTE: Stations without precipitation normals are indicated by asterisks.

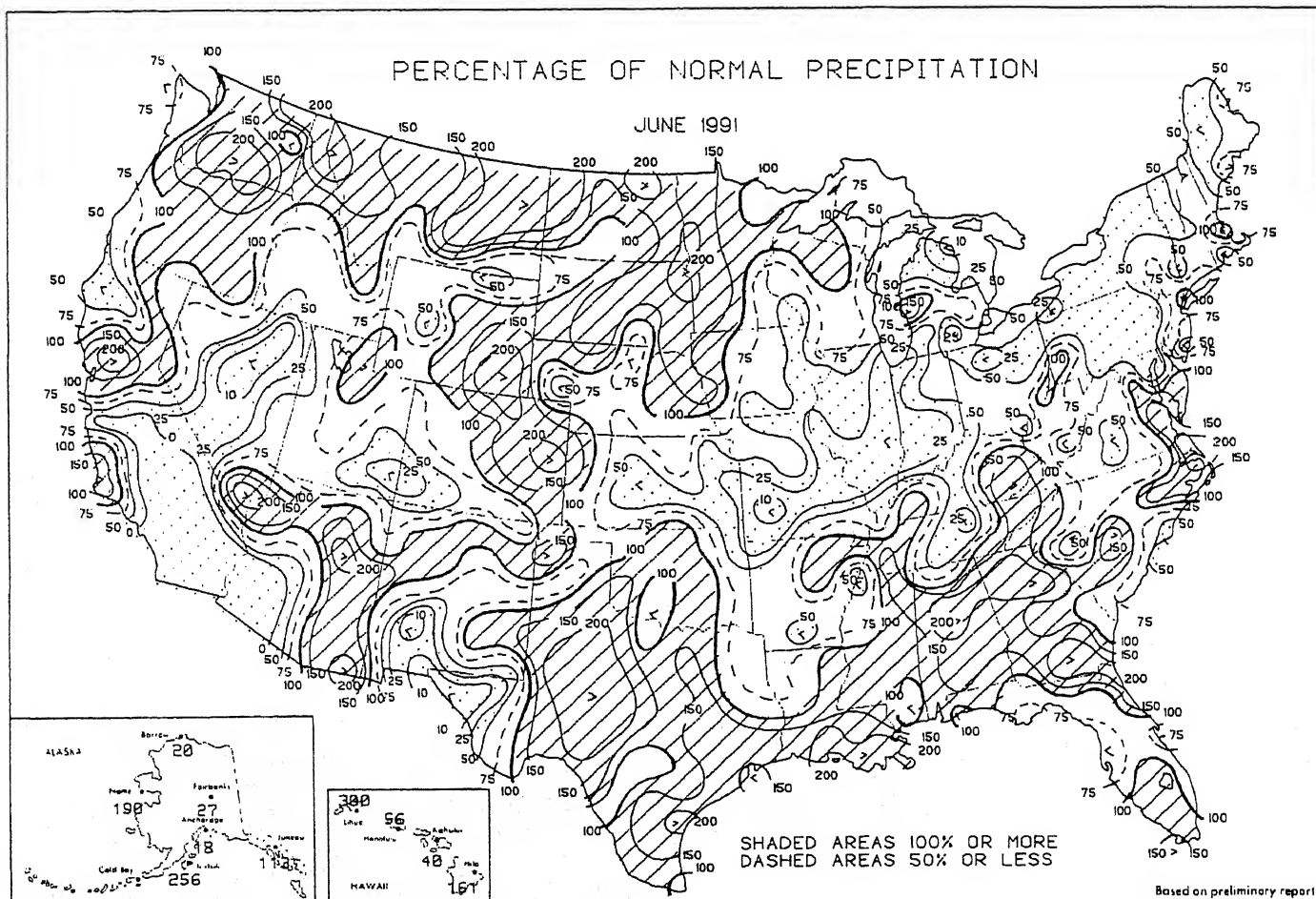


FIGURE 1. June 1991 Percent of Normal Precipitation. Isopleths drawn for 0, 25, 50, 75, 100, 150, and 200 percent. More than twice the normal June rainfall fell in portions of Northern California, the Pacific Northwest, the Intermountain West, the Great Plains, the Gulf and Atlantic seaboard, southern Alaska, and western Hawaii. In contrast, less than half of normal rainfall was measured in much of the Corn Belt and Northeast as well as parts of the Mid-Atlantic, Great Lakes, central Plains, upper Rio Grande Valley, Great Basin, Far West, Alaska, and Hawaii.

TABLE 2. SELECTED STATIONS WITH 40% OR LESS OF THE NORMAL PRECIPITATION AND NORMAL PRECIPITATION OF 3.00 INCHES OR MORE DURING JUNE 1991.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)	STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)
ALPENA, MI	0.19	6.1	3.11	GREEN BAY, WI	1.08	34.3	3.15
TRAVERSE CITY, MI	0.20	6.3	3.15	BALTIMORE, MD	1.08	28.9	3.74
SPRINGFIELD, MO	0.24	5.2	4.66	SAULT STE. MARIE, MI	1.09	33.6	3.24
BURLINGTON, IA	0.32	6.1	5.27	MILLVILLE, NJ	1.14	32.7	3.49
JACKSON, MI	0.34	9.9	3.43	RUSSELL, KS	1.15	32.4	3.55
ST. LOUIS, MO	0.44	11.9	3.70	JOPLIN, MO	1.18	24.1	4.90
EASTPORT, ME	0.61	19.7	3.09	LOUISVILLE, KY	1.23	34.4	3.58
SOUTH BEND, IN	0.62	15.8	3.92	NASHVILLE, TN	1.25	34.1	3.67
FINDLAY, OH	0.65	19.1	3.41	SPRINGFIELD, IL	1.26	35.8	3.52
EVANSVILLE, IN	0.65	18.6	3.50	WASHINGTON/NATIONAL, DC	1.27	38.1	3.33
ERIE, PA	0.74	18.9	3.91	BURLINGTON, VT	1.30	35.9	3.62
LA CROSSE, WI	0.79	19.2	4.12	MOLINE, IL	1.30	30.2	4.30
GLENS FALLS, NY	0.81	25.8	3.14	WILLIAMSPORT/LYCOMI, PA	1.34	34.7	3.86
AKRON, OH	0.81	24.9	3.25	WICHITA, KS	1.34	33.5	4.00
LYNCHBURG, VA	0.89	25.6	3.47	CLEVELAND/HOPKINS, OH	1.37	39.5	3.47
DODGE CITY, KS	0.91	30.3	3.00	CINCINNATI, OH	1.39	34.2	4.07
INDIANAPOLIS, IN	0.91	22.9	3.97	LAFAYETTE, IN	1.39	32.4	4.29
CHICAGO/O'HARE, IL	0.95	22.1	4.29	MEMPHIS, TN	1.41	39.5	3.57
ALTOONA, PA	0.97	27.7	3.50	PADUCAH, KY	1.47	33.0	4.45
ALLENTOWN, PA	1.01	29.4	3.43	ZANESVILLE, OH	1.49	35.9	4.15
FAYETTEVILLE, AR	1.01	22.3	4.52	CEDAR RAPIDS, IA	1.49	33.6	4.44
MANSFIELD, OH	1.02	29.7	3.44	TOPEKA, KS	1.49	29.0	5.14
CAPE GIRARDEAU, MO	1.05	29.9	3.51	PEORIA, IL	1.50	38.7	3.88
CROSSVILLE, TN	1.05	24.0	4.38	GREENVILLE, SC	1.72	39.4	4.36
HAMPTON/LANGLEY AFB, VA	1.07	28.6	3.74	HARRISON, AR	1.84	39.3	4.68

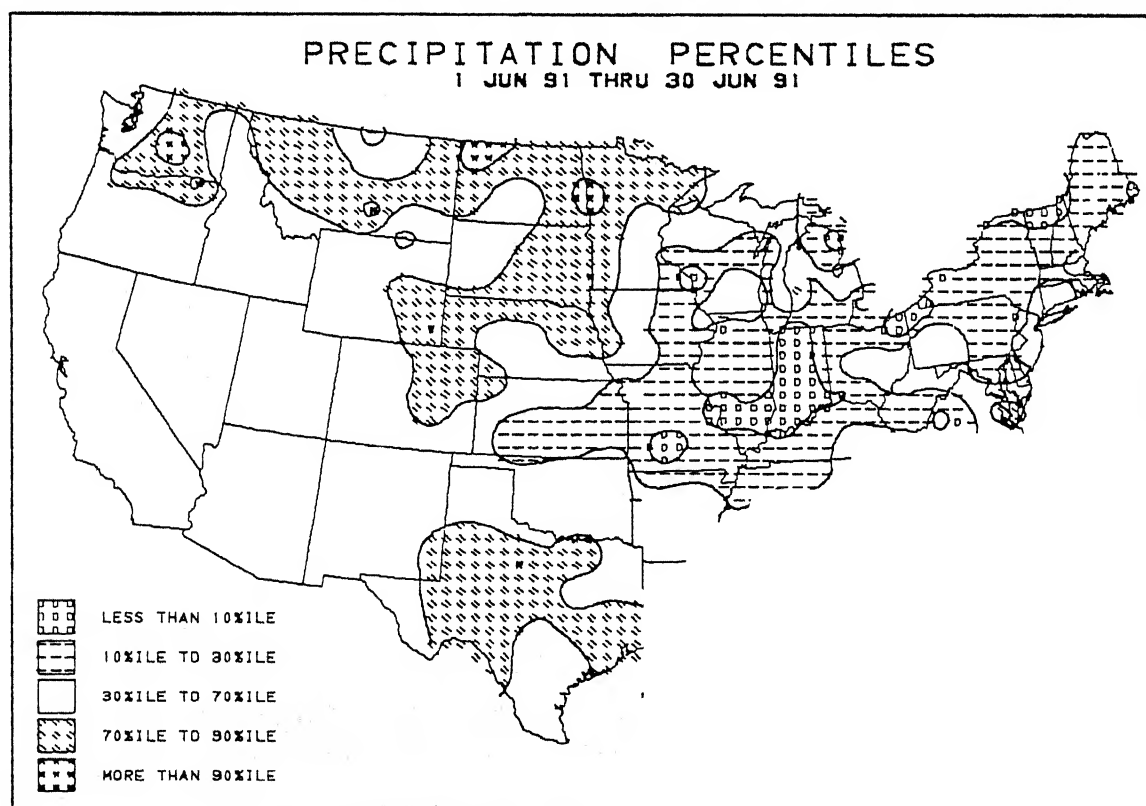


FIGURE 2. June 1991 Precipitation Percentiles. Significant portions of the central Plains, the eastern two-thirds of the Corn Belt, and most of New England. Most of Indiana and southern Illinois. In contrast, June wetness affected the southern Appalachians, Texas, across much of the upper Mississippi and middle Missouri valleys and central High Plains.

TABLE 3. JUNE 1991 AVERAGE TEMPERATURE 4.5°F OR MORE ABOVE NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
KOTZEBUE, AK	+6.8	50.5	AKRON, OH	+4.9	72.7
TRAVERSE CITY, MI	+6.3	69.9	GRAND FORKS, ND	+4.9	68.8
NOME, AK	+6.3	51.6	DEVIL'S LAKE, ND	+4.9	67.1
HURON, SD	+5.7	73.4	MINNEAPOLIS, MN	+4.8	72.8
MILWAUKEE, WI	+5.7	70.6	DUBUQUE, IA	+4.8	72.4
EAU CLAIRE, WI	+5.5	71.6	ABERDEEN, SD	+4.8	71.0
LA CROSSE, WI	+5.4	74.0	FARGO, ND	+4.8	70.1
ROCHESTER, MN	+5.4	72.2	HANCOCK/HOUGHTON CO, MI, MI	+4.8	63.6
HOUGHTON LAKE, MI	+5.4	68.2	EASTPORT, ME	+4.8	62.0
SIOUX FALLS, SD	+5.1	73.4	COLUMBUS, OH	+4.6	75.0
ERIE, PA	+5.1	70.2	SPENCER, IA	+4.6	73.2
ST. LOUIS, MO	+5.0	79.8	MASON CITY, IA	+4.5	72.7
WATERLOO, IA	+5.0	74.0	ALEXANDRIA, MN	+4.5	69.6
INTERNATIONAL FALLS, MN	+5.0	66.1	FAIRBANKS, AK	+4.5	63.9
PELLSTON, MI	+5.0	65.8	SAULT STE. MARIE, MI	+4.5	63.0
SOUTH BEND, IN	+4.9	73.8			

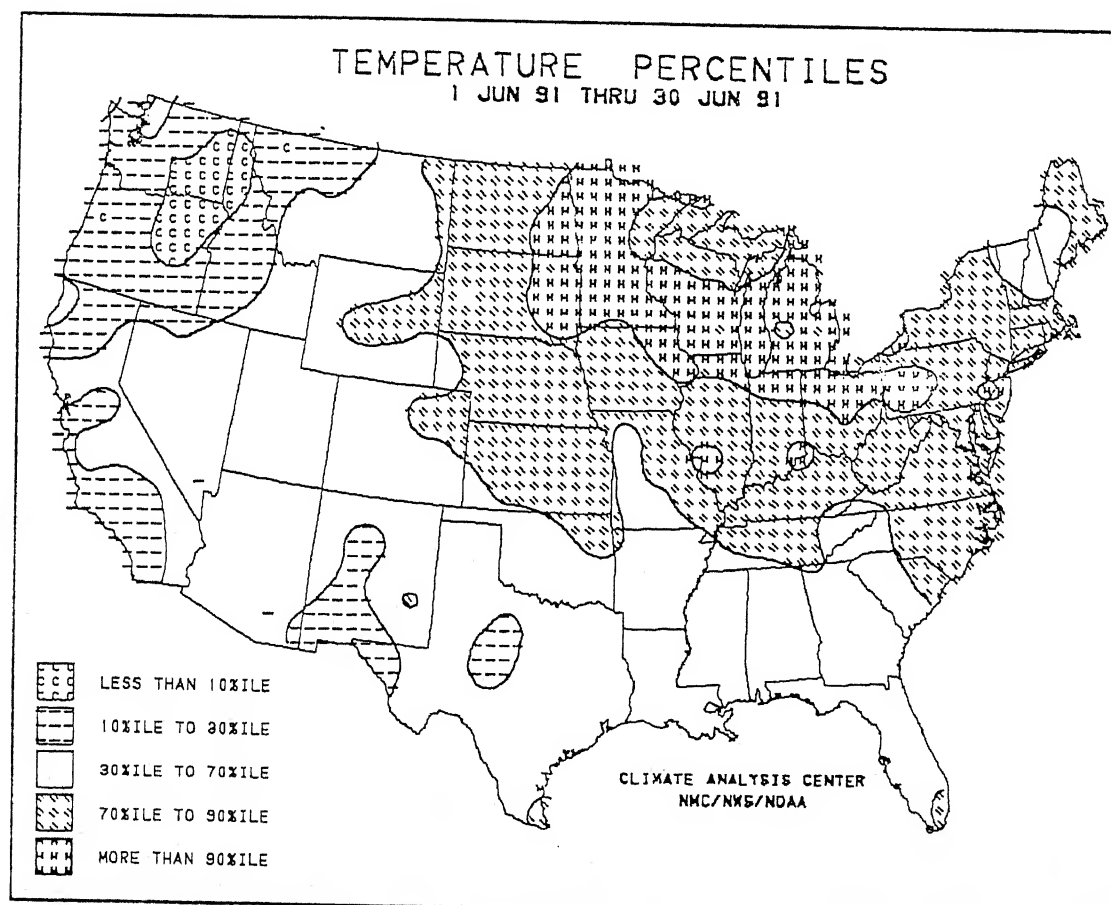


FIGURE 3. June 1991 Temperature Percentiles. Significant June warmth [$>70\%$ ile] was recorded from the northern and central High Plains eastward to the northern and mid-Atlantic coast with a large portion of the upper Midwest and Great Lakes ranking in the upper (warm) 10% climatologically. In contrast, the Pacific Northwest, western California, and portions of the southern Rockies and Texas observed unusual coolness [$<30\%$ ile] with eastern Oregon and Washington recording percentiles in the lower (cold) 10% of climatological occurrences.

TABLE 4. JUNE 1991 AVERAGE TEMPERATURE 3.0°F OR MORE BELOW NORMAL.

<u>STATION</u>	<u>DEPARTURE</u>	<u>AVERAGE</u>	<u>STATION</u>	<u>DEPARTURE</u>	<u>AVERAGE</u>
	(°F)	(°F)		(°F)	(°F)
PENDLETON, OR	-6.5	59.7	REDDING, CA	-3.5	73.3
WINSLOW, AZ	-5.8	66.7	IMPERIAL, CA	-3.5	82.4
BURNS, OR	-5.7	54.8	KALISPELL, MT	-3.4	54.9
LEWISTON, ID	-5.6	60.4	EUGENE, OR	-3.4	57.8
WALLA WALLA, WA	-5.1	61.8	GREAT FALLS, MT	-3.4	58.3
SPOKANE, WA	-4.9	56.8	OAKLAND, CA	-3.4	58.4
MEACHAM, OR	-4.8	49.1	DEMING, NM	-3.4	73.6
BAKER, OR	-4.5	55.1	STAMPEDE PASS, WA	-3.2	46.1
WENATCHEE, WA	-4.3	63.2	RED BLUFF, CA	-3.2	72.9
SEXTON SUMMIT, OR	-4.2	52.0	PASO ROBLES, CA	-3.1	65.6
YAKIMA, WA	-4.1	60.3	BOISE, ID	-3.0	62.8
BLYTHE, CA	-3.8	84.7	DOUGLAS, AZ	-3.0	73.8

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)
JUNE 1991

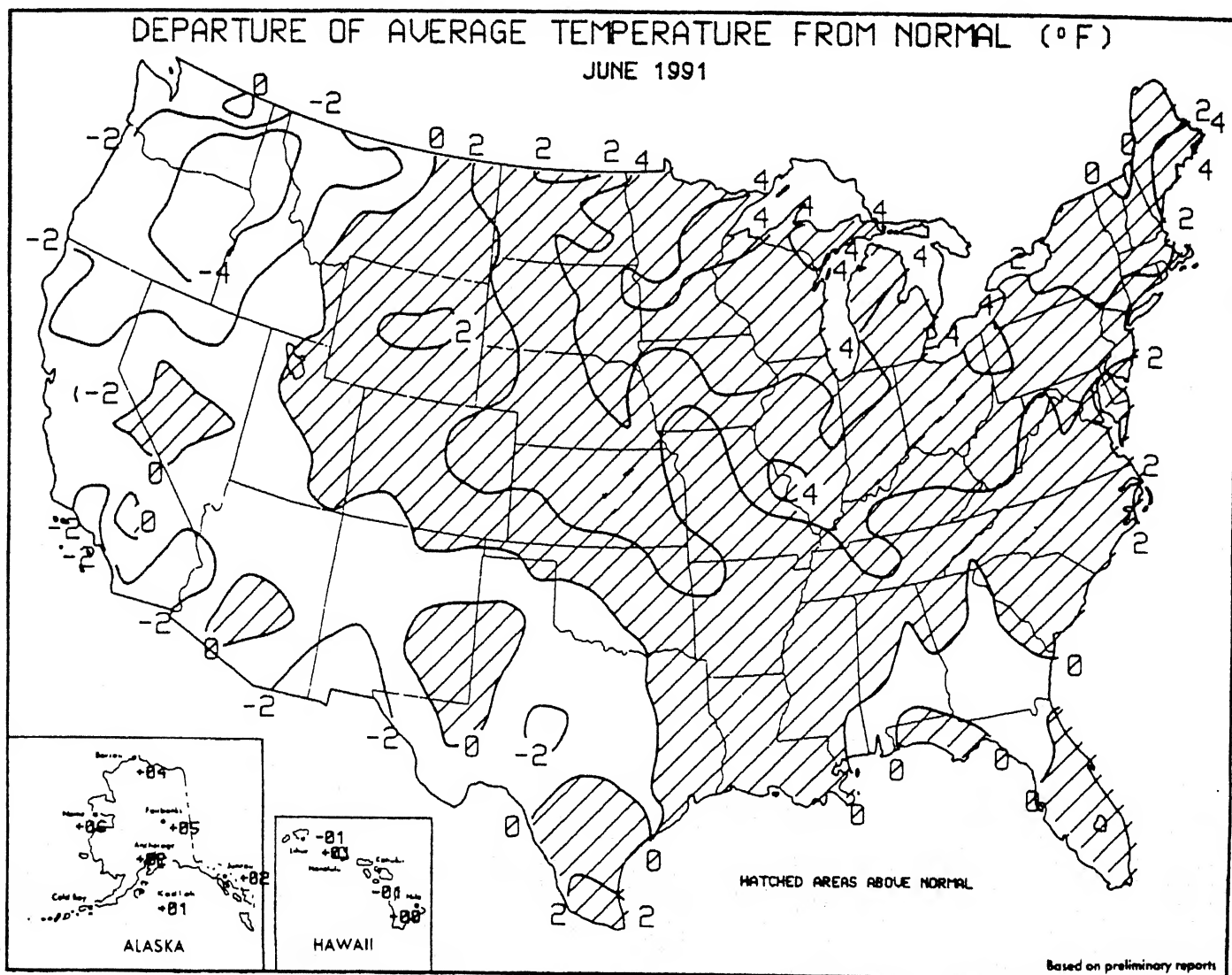


FIGURE 4. June 1991 Departure of Average Temperature from Normal (°F). *Isopleths drawn only for -4°F, -2°F, 0°F, and 4°F. Much of the nation once again experienced warmer than normal conditions as monthly departures reached +4°F in portions of northern New England, the Midwest, and Great Lakes Region. Below normal temperatures were confined to parts of the Southeast, southern Plains, and much of the western third of the nation. Abnormally cool weather prevailed only in the Pacific Northwest where departures of -4°F were observed*

TABLE 5. RECORD JUNE PRECIPITATION.

<u>STATION</u>	<u>TOTAL</u> (INCHES)	<u>NORMAL</u> (INCHES)	<u>PCT. OF</u> <u>NORMAL</u>	<u>RECORD</u> <u>TYPE</u>	<u>RECORDS</u> <u>BEGAN</u>
ATLANTA, GA	9.99	3.39	294.7	HIGHEST	1947
WILLISTON, ND	6.13	2.66	230.5	HIGHEST	1947
YAKIMA, WA	2.54	0.58	437.9	HIGHEST	1947
PENDLETON, OR	2.17	0.68	319.1	HIGHEST	1947
CHICAGO/O'HARE, IL	0.95	4.29	22.1	LOWEST	1959
LACROSSE, WI	0.79	4.12	19.2	LOWEST	1952
ERIE, PA	0.74	3.91	18.9	LOWEST	1954
EVANSVILLE, IN	0.65	3.50	18.6	LOWEST	1951
SPRINGFIELD, MO	0.24	4.66	5.2	LOWEST	1951
ALPENA, MI	0.19	3.11	6.1	LOWEST	1873

NOTE: Trace precipitation is considered ZERO precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.

TABLE 6. RECORD JUNE AVERAGE TEMPERATURES.

<u>STATION</u>	<u>AVERAGE</u> (°F)	<u>NORMAL</u> (°F)	<u>DEPARTURE</u> (°F)	<u>RECORD</u> <u>TYPE</u>	<u>RECORDS</u> <u>BEGAN</u>
LACROSSE, WI	74.0	68.5	+5.4	HIGHEST	1952
ROCHESTER, MN	72.2	66.7	+5.4	HIGHEST	1961
WATERLOO, IA	74.0	69.1	+5.0	HIGHEST	1951
SOUTH BEND, IN	73.8	68.9	+4.9	HIGHEST	1944
AKRON, OH	72.7	67.8	+4.9	HIGHEST	1944
EASTPORT, ME	62.0	57.2	+4.8	HIGHEST	1874
SAULT STE. MARIE, MI	63.0	58.5	+4.5	HIGHEST	1947
PHILADELPHIA, PA	75.5	71.6	+3.9	HIGHEST	1947
MUSKEGON, MI	69.4	65.5	+3.9	HIGHEST	1951
NEW YORK/LA GUARDIA, NY	74.6	71.1	+3.6	HIGHEST	1947

TABLE 7. RECORD JUNE EXTREME TEMPERATURES.

<u>STATION</u>	<u>EXTREME</u> (°F)	<u>DATE</u>	<u>RECORD</u> <u>TYPE</u>	<u>RECORDS</u> <u>BEGAN</u>
PHILADELPHIA, PA	100°F	JUNE 16	HIGHEST	1941
PORTLAND, ME	98°F	JUNE 28	HIGHEST	1940
PENDLETON, OR	35°F	JUNE 3	LOWEST	1935
MISSOULA, MT	31°F	JUNE 15	LOWEST	1945

TEMPERATURE RANKINGS FOR JAN-JUN 1991, BASED ON THE PERIOD 1895 TO 1991. 1 = COLDEST AND 97 = WARMEST.

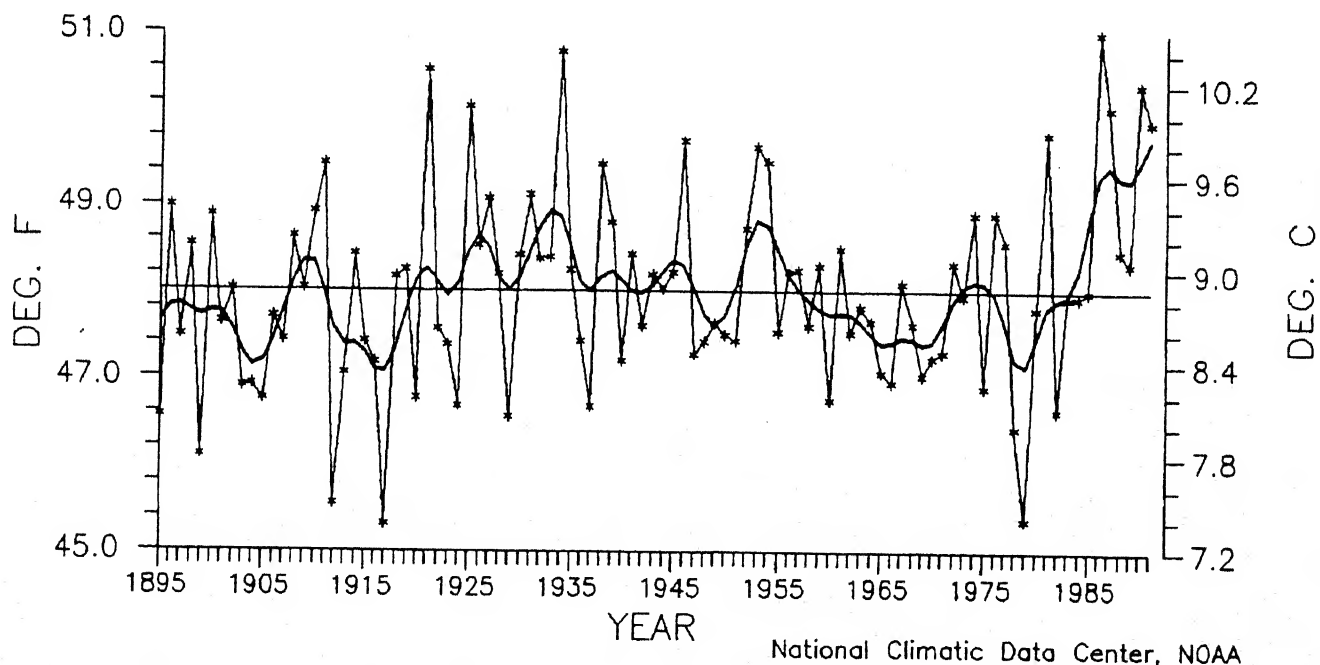
<i>STATE</i>	<i>RANK</i>	<i>STATE</i>	<i>RANK</i>	<i>STATE</i>	<i>RANK</i>	<i>STATE</i>	<i>RANK</i>
AL	74	IA	90	NE	90	RI	97
AZ	50	KS	94	NV	40	SC	88
AR	86	KY	96	NH	95	SD	90
CA	39	LA	72	NJ	97	TN	89
CO	77	ME	78	NM	64	TX	73
CT	97	MD	97	NY	95	UT	30
DE	95	MA	95	NC	95	VT	95
FL	97	MI	95	ND	95	VA	97
GA	79	MN	94	OH	96	WA	46
ID	61	MS	78	OK	93	WV	95
IL	95	MO	91	OR	36	WI	94
IN	96	MT	79	PA	96	WY	81

National Climatic Data Center

Top 10 rankings : **BOLD**

Bottom 10 rankings : *Italics*

**U.S. NATIONAL TEMPERATURE
JANUARY-JUNE, 1895-1991**



January - June Nationally Averaged Temperatures, 1895-1991, as Computed by the National Climatic Data Center. *The first half of the year has been unusually warm, ranking as 7th warmest January - June period on record. January - June temperatures have averaged above normal for the last six years.*

PRECIPITATION RANKINGS FOR JAN-JUN 1991, BASED ON THE PERIOD 1895 TO 1990. 1 = DRIEST, 97 = WETTEST.

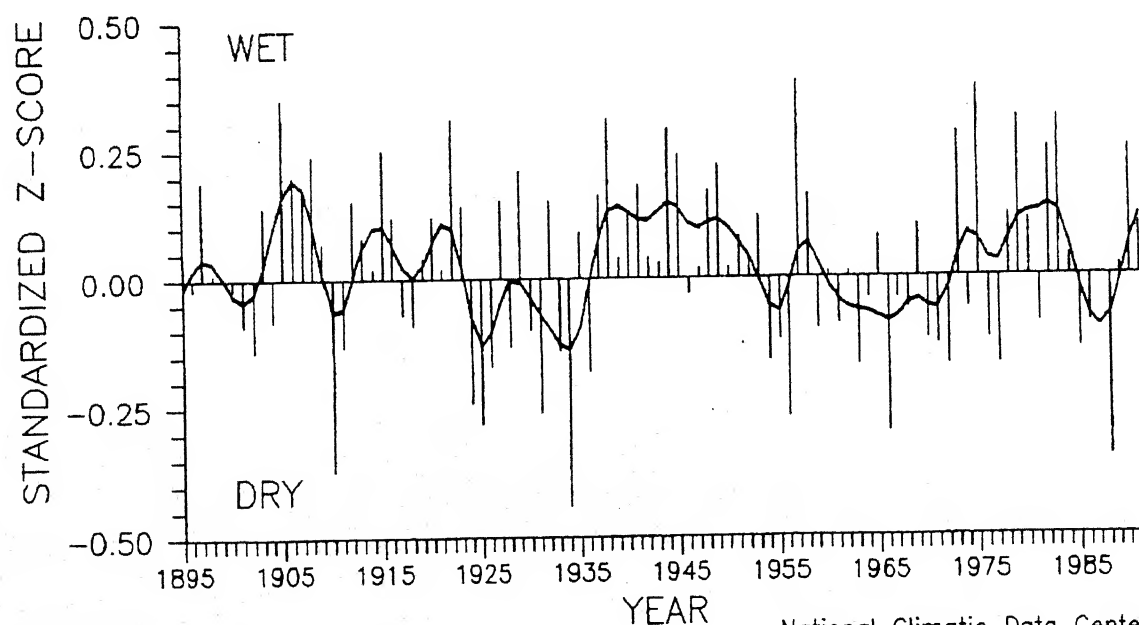
<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>	<u>STATE</u>	<u>RANK</u>
AL	97	IA	91	NE	77	RI	49
AZ	72	KS	29	NV	47	SC	74
AR	79	KY	54	NH	15	SD	95
CA	54	LA	97	NJ	42	TN	64
CO	19	ME	29	NM	42	TX	75
CT	55	<i>MD</i>	<i>9</i>	NY	22	UT	40
DE	39	MA	42	NC	44	VT	14
FL	97	MI	58	ND	89	VA	36
GA	94	MN	90	OH	16	WA	79
ID	54	MS	97	OK	39	WV	27
IL	38	MO	25	OR	44	WI	73
IN	22	MT	87	PA	13	WY	67

National Climatic Data Center

Top 10 rankings : **BOLD**

Bottom 10 rankings : *Italics*

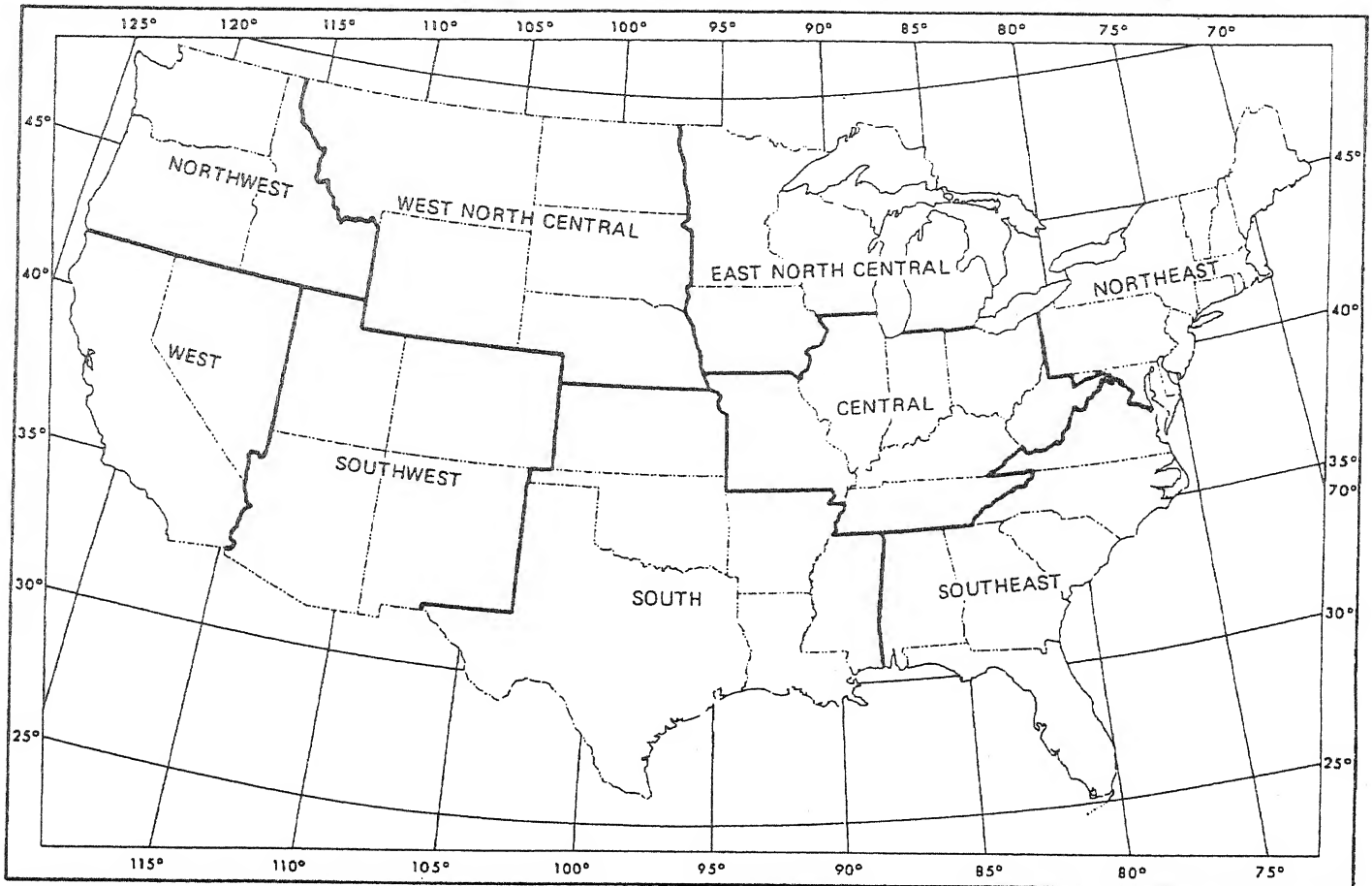
**U.S. NATIONAL MEAN PRECIPITATION INDEX
JANUARY-JUNE, 1895-1991**



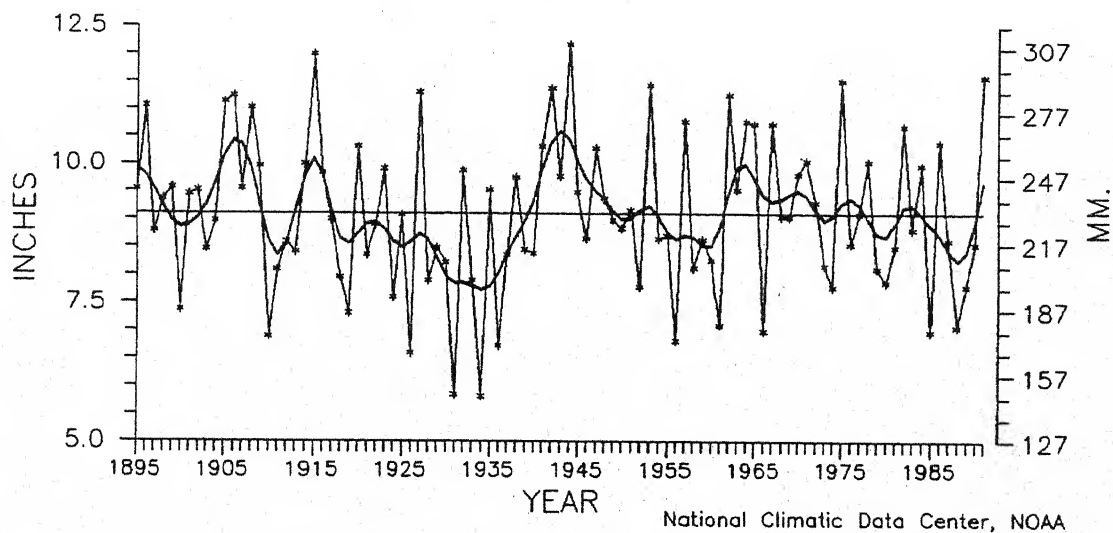
National Climatic Data Center, NOAA

January - June Nationally Averaged Precipitation Index, 1895-1991, As Computed By The National Climatic Data Center. *The first half of the year averaged above the median (36th wettest such period) primarily due to a wet Spring. This index takes into account local normals so that typically wet areas do not dominate the index.*

THE 9 U.S. REGIONAL BOUNDARIES AS DEFINED BY THE NATIONAL CLIMATIC DATA CENTER (NCDC) AND REGULARLY USED IN THE MONTHLY AND SEASONAL U.S. CLIMATE SUMMARIES.



WEST NORTH CENTRAL REGION PRECIPITATION JANUARY–JUNE, 1895–1991



January – June Precipitation Averaged across the West–North–Central Region, 1895 – 1991. The region as a whole experienced the third wettest such period on record in 1991, contrasting sharply with the subnormal precipitation measured in January – June during the previous four years.